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APPLICATIONS OF WATER ANALYSIS.

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Address of Acting Chairman, Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

The practical side of any subject appeals to the majority of people so that the question most frequently in the minds of those who are informed that water analyses are being made is, "What is the use of water analysis?" A brief answer to the question would be that a water analysis is made for the purpose of safeguarding the health or of saving money. Often the first of these reasons is explained in terms of the second for it is often necessary to appeal to the pockets of the voter in order to obtain sufficient means for safeguarding the health of a community. Because of the two points above mentioned, water analysis naturally divides itself into sanitary water analysis and what we might call "commercial water analysis." The members of the laboratory section of the American Public Health Association are familiar with the applications and advantages of a sanitary water analysis. They are also familiar with the analytical data of the so-called mineral waters and with their therapeutic uses. Possibly many of them have not thought of the commercial applications or of the related analytical work which a water analyst may be called upon to perform. A brief statement concerning some of the other work that may be done by the water analyst should be of interest.

The Illinois State Water Survey is authorized by law to make any investigations that will enable the citizens of the state to obtain and maintain an abundant supply of water for domestic or manufacturing uses. It is not under the control of a board of health and is therefore called upon to perform analytical work not only to safeguard the health but is also called on to make the so-called "commercial analyses."

It is the purpose of the Survey in its sanitary water analysis to make analyses that will enable the citizens of the state to *obtain* and *maintain* both public and private water supplies in a state of purity. While analysis

may be made of a water supposed to have caused typhoid fever or other water borne diseases, the Survey recommends that other possible causes be investigated before the water analysis is made. Chemical, bacteriological, and microscopical examinations are made according to regular approved methods, which it seems hardly worth while at this time to discuss in detail.

It is especially the applications of water analysis not directly related to the public health that I propose to describe.

The analyst is often called upon to assist municipal authorities in their choice of a water for their supply. Two or more sources of supply may be available, all of which are either pure or can be readily purified to meet sanitary conditions; then there arises a necessity for the determination of the mineral content. The experience of the city of Belleville, Illinois, is an example of what happens. For years it had used water from deep wells which was soft, though containing a considerable quantity of sodium salts. The supply being inadequate, it was necessary to increase the supply. This was done by drilling wells in the alluvial drift along the Mississippi River. The water obtained was much harder and was received by the housewives with much disapproval. The character of the mineral content has made it advisable to substitute the softer water of the Mississippi River.

The analyst is asked to determine the cause and suggest a remedy for corrosion in boilers and on the outside of water mains. An analysis of the mineral content will usually explain the cause of the corrosion in boilers and the proper amount of lime or soda ash to neutralize the corrosive ingredients can be readily calculated.

A water main near the spoil bank of a coal mine was badly corroded on the outside due to the presence of iron sulfate formed by the oxidation of iron pyrites in the waste from the mine. A protective coating or suitable drainage are remedies.

The analyst is asked to determine the cause and suggest a remedy for foaming in boilers. This trouble is usually found to be due to an excessive amount of sodium salts. The simplest remedies are either the careful blowing down of the boilers to prevent concentration, or a modification of the boilers to give ample steam space above the water line.

A very common complaint that reaches the analyst is that waters will form a scale in boilers or in hot water systems or even in the mains. The scale in boilers is due to the presence of carbonates of calcium and magnesium which form a soft scale and carbonates and sulfates of the same elements which form a hard scale. The best remedy for this difficulty is the construction of a softening plant to remove the carbonates and sulfates before the water enters the boilers. When this is not practicable, the use of the proper amount of a boiler compound may be recommended.

Scaling in the steam pipes of heating systems has been found to be due to ammonium carbonate. Some waters in Illinois contain large quantities

of ammonia and carbonates. These at the high temperature of the boiler are dissociated. In the cooler parts of the system they are reunited and cases have been reported to us where the pipes have been entirely clogged by crystalline ammonium carbonate.

The scaling in water mains may be due to incomplete reaction in water treatment with lime. The Survey has had brought to its notice a case where a 20-inch pipe has been reduced to a diameter of 8 inches because of this incrustation. It was suggested that solution in acid would remove the incrustation but the amount of acid required (84 tons) and the difficulties of application rendered this scheme inadvisable. The scale was removed much more economically by taking up portions of the pipe and chipping out the incrustation. To prevent scaling of this kind there should be arrangements for complete reaction of the lime in suitable mixing chambers and large settling basins before the water enters the mains.

Even in Illinois the analyst is sometimes called upon to give an opinion concerning the value of water for use in irrigation. Many available waters, especially from deep wells, contain large quantities of mineral matter making them unsuitable for irrigation. Complaints have come from the florists and gardeners. With proper drainage some highly mineralized waters may be used but it is the duty of the analyst to determine the conditions under which the water may be used.

One of the most important problems which the analyst is called upon to consider is the removal of iron. An experimental plant was constructed and operated for several months at the University of Illinois. With the particular water in question it was found that simple aëration and filtration would be satisfactory. However, after a plant was constructed and operated continuously it was found that the sand bed clogged very rapidly because of an enormous growth of crenothrix throughout the sand bed which made it impossible to wash the filters satisfactorily. The use of hypochlorite has been effective in killing the crenothrix so that the filters could be satisfactorily washed. A reduction of the iron from 2 parts per million to less than .05 parts per million has been effected.

Specimens of service pipes almost entirely clogged with a black powder have been brought to the analyst for examination. These powders have contained considerable proportions of manganese. An examination of the water from the sources from which the supply was obtained has showed small quantities of manganese in the original water. The recommendation in one case where the source of supply was from a reservoir fed by springs was the construction of a filter and a softening plant. The recommendation in another case where the amount of manganese in the water varied from .01 parts per million to 1.2 parts per million in six wells, was the use, as far as possible, of the water containing the small quantities of manganese.

In addition to the work done for the State Board of Health, the Illinois

State Water Survey has coöperated with other state departments, for example, with the State Laboratory of Natural History, The State Geological Survey, and the Rivers and Lakes Commission.

Examination of the Chicago Drainage Canal and the Illinois River to determine its condition as affected by Chicago sewage and to determine the probable effect on fish life was made in coöperation with the State Laboratory of Natural History. The condition of the river as indicated by the small amounts of dissolved oxygen confirms the observations of the State Laboratory of Natural History, that sewage organisms were present in abundance in the upper reaches of the river but gradually died out farther down. The fresh water organisms, both animals and plants, were entirely absent in the upper reaches of the river and began to appear farther down where self purification had taken place. Gases arising from the river have been analyzed and found in composition to resemble the gases from septic tanks and to differ widely from the gases from unpolluted swamps. The sludge in the river bottom shows interesting variations in the content of fat and nitrogenous organic matter.

A study of the relation of the composition of water to the strata has been carried on with the State Geological Survey. Wells in the northern part of the state and entering certain strata furnish a water suitable for domestic uses. Waters from deep wells to the southward, in strata corresponding to wells farther north, are so highly mineralized that it is impossible to use them for domestic supplies. By analyses of water from different strata, the analyst can advise the driller as to the proper arrangement of casing. From records he can prophesy the composition of water to be expected in new wells.

The Rivers and Lakes Commission of Illinois has power to hear complaints concerning nuisances caused by waste matters emptied into the streams of lakes of the state. Analyses of the water and sanitary surveys of the rivers of the state made by the State Water Survey are used by the Rivers and Lakes Commission.

The State Food Commission has taken up the study of the bottled waters.

From time to time various processes of water or sewage treatment are suggested. The examination of such processes by disinterested parties is valuable. Some of these processes have been tested in the laboratories of the Water Survey or have been examined in the field.

We have not as yet been able to install an experimental plant for the treatment of sewage but tests have been made on the local plants at Champaign and Urbana. The plant for the electrolytic treatment of sewage of Oklahoma City was visited by a representative of the Survey with the result that more successful operation must be shown before the Survey will approve the construction of similar plants in the state of Illinois.

An apparatus for sterilization of water by ultra violet rays is installed in

the laboratory and has been used successfully. Water softening with lime and soda has been carried out on a small scale. A slow sand filter and a rapid mechanical filter are installed in the hydraulics laboratory of the University and are available for special tests or for the use of students. A Permutit water softening apparatus has been purchased and given a thorough test in the laboratory of the Water Survey.

An article on the applications of water analysis would hardly be complete without a brief statement of some of the related work which can be done by an analyst in charge of a water works laboratory. If the plant be a filter plant he may make the analyses of sand to determine its availability for use in filters. From sand analyses the builders of filter plants have been assured that local sands could be substituted for special sand which must be shipped from a distance at a saving of several dollars a yard.

Practically all water works must use coal as a source of power. Analyses of the coal and the purchase on specifications will result in reduced operating expenses since the dealers may be checked in accordance therewith.

Some water analysts have effected savings by making analyses of oils, others by the analyses of the mineral content of the water and the mixing of suitable compounds to soften the water used in the boilers. In filter plants and water softening plants analyses of the alum, lime, soda and bleaching powder used enable the operator to obtain a better control of and to increase the efficiency of the plant.

If any conclusions can be drawn from the examples of work of a water analyst enumerated in this paper, the most important are that water analysis has wide applications and the analyst should have a broad and thorough training that he may be competent to study and solve many and varied problems.

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THE VALUE OF ROUTINE WATER ANALYSIS IN SANITARY SURVEYS.

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Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

For forty years and more the chemical analysis of water has been a part of the routine of every chemical laboratory. The consulting chemist has done his work in a purely perfunctory way, content to report certain definite characteristics, and confident that his results would be understood by the person for whom they were intended. For a somewhat shorter period, bacteriological examinations have also been made on water samples and a satisfactory sanitary analysis is not now held to be complete unless both chemical and bacteriological data are determined.

The necessity for developing standard methods of work is obvious. Unless the skilled graduate follows certain definite paths he reaches no goal; unless his results are intelligible to his colleague, they are largely worthless; unless the sanitary officer is assured that the reports he receives are obtained by following certain procedures, he can place no confidence in them. For these reasons standard methods of water analysis have been suggested for years, and chemists and sanitarians, working through the committees of the chemical section of the American Association for the Advancement of Science, and later through the committee on standard methods of water analysis of the American Public Health Association, have culled out of the great mass of literature on the subject a few basic tests which have come to be accepted routine of all laboratories engaged in the examination of waters. Important as has been the work of these committees, essential as are the methods to the chemist, the acceptance of standard methods has undoubtedly restricted further research and given the analyst a too complete satisfaction that the tools, as it were, of his trade can not be improved, and that the results he obtains are the final estimate of quality.

In the course of my experience in the water laboratory, involving the analysis of some fifteen thousand samples of water from public and private sources, I have each year felt my assurance, that the work was sufficiently complete to warrant definite conclusions, diminish, and my faith in the value of the factors, nitrates, nitrites, chlorine, free ammonia, albuminoid ammonia, waver. The hundreds of samples shown to be chemically bad and bacterially good, or bacterially good and chemically bad, have increased my doubt as to the positive value of the results. Every chemist who has had more than a limited experience, has, I am sure, experienced

the same doubt and adopted, as we have ourselves done, the practice of classing as unsafe, waters which a single analysis, usually all that it is possible to obtain on isolated well samples, shows to be either chemically or bacterially out of accord with our accepted standards. Such interpretations, from the standpoint of the sanitarian, are the only safe interpretations, but they are not at all satisfactory to the chemist who knows that his action may condemn a potable water. Something more than laboratory results are essential, for the data collected for a well water of one part of the state might condemn it, while similar chemical factors might well be reliable evidence of potability in the case of water from another source. In New England high chlorines are almost undisputed evidence of sewage pollution, and the construction of isoclors was necessary before we could classify waters from various parts of the state. In the central states the chlorine content is of little moment unless complete information is at hand as to the source of the supply for thousands of square miles have been so filled with deep borings for gas and oil that the original salt content of both river and well waters has long since disappeared and the present factor is determined only by the amount of salt water from the lower levels that has mixed with the surface and near surface supply. The same explorations that have laden our streams and ground waters with salt have introduced other factors, unusual and sometimes with difficulty explainable. Abnormally high ammonia accompanied by very low nitrates and nitrites, conditions usually attributable to raw sewage, are not uncommon in well waters. Factors for nitrites, for iron and for hardness may depart widely from accepted standards and yet have no sanitary significance. And just as is the case with chemical data, so bacterial counts may fail to tell the whole truth. Water from the Ohio River at any point between Cincinnati and Evansville contains colon bacilli, and yet for years this water has been used for drinking and for domestic purposes by dwellers on both sides of the river and by crew and passengers on river boats. In view of what we know of the entrance of sewage into the stream, we are fully justified in condemning the water for drinking purposes, but is not such condemnation based more upon esthetic grounds than upon a study of chemical data, which in the lower reaches of the river is satisfactory, and of bacterial data which does not wholly coincide with the vital statistics of many river towns. All of these generalities, with their dubious import, but lead up to the question at issue, of what value are the routine analyses which form so large a part of the work of sanitary surveys?

In the last five years we have made elaborate investigations of the sanitary condition of the water of the southern end of Lake Michigan, of the Calumet River, the Ohio River for some three hundred and sixty miles, and the Wabash River from its source to its mouth, and we are at present completing our survey of the large water courses of the state by a similar

study of the White River from source to mouth. In all of this work we have followed the usual procedure originally laid down by the Massachusetts State Board of Health under Drown, by workers at the Massachusetts Institute of Technology, and accepted everywhere, in this country at least, as essential to satisfactory results. That is, on the thousands of samples analyzed, we have been careful to estimate nitrates, nitrites, chlorine, oxygen dissolved, oxygen consumed, hardness, odor, turbidity and sediment, and in addition we have made bacterial counts and the presumptive test for B. coli with frequent checks to positively identify the colon bacillus. Each year the labor involved in these elaborate analyses has seemingly become more oppressive, and especially since the results have in most cases been of so little moment.

We have been able to show in a graphic manner the rise and fall of chlorine content as a variable dependent almost entirely upon two factors, first, the inflow of salt water from oil wells, secondly, the variation of the flow of the stream. The chlorine content of streams draining the oil wells is abnormally high and varies according to the activity of the oil operators. The existence of such a source of chlorine destroys absolutely any value the chlorine factor might otherwise have in indicating pollution by the run off from inhabited areas.

The nitrate factor, long held of vital importance, has not in these surveys been of any special significance. Streams so loaded with sewage as the Ohio, Wabash and White Rivers show a surprisingly low nitrate content which varies so slightly following the introduction of fresh supplies of sewage as to be negligible in the interpretation of results.

The nitrite factor, of material value in the examination of well supplies and in the study of sewages, is of little moment in the analysis of river and lake waters, varying more widely during conditions of high and low water than because of the inflow of sewage or the oxidation of nitrogeneous material. This observation does not hold true in the case of the Calumet River, or indeed the White River, streams so full of sewage in portions of their flow as to be little different from septic tanks. But it is certainly true of such rivers as the Ohio and the Wabash, and of lakes and impounded streams having a low organic content. It is unnecessary to point out the little value of alkalinity determinations, for while the engineer may find this factor valuable in determining the suitability of water for boiler purposes, a single analysis is as good as a thousand. The laundryman is mightly concerned in the hardness of his water supply, but he, too, needs no extended survey to furnish him the information he desires. Alkalinity values vary with the inflow of tributaries and with the rise and fall of the stream. Under certain conditions, obtaining in mining regions where acid waters are sometimes met with, this factor cannot be neglected by operators of filtration plants, and in such cases the data should be obtained by them as required.

Free and albuminoid ammonia contents cannot be held to be entirely negligible for they are of considerable value in indicating the condition of organic refuse. But they, too, in common with the other factors referred to, are variables depending more upon low and high water, temperature and normal vegetable growths than upon pollution, except in the case of waters so grossly contaminated as to be classed as dilute sewages.

We have found, however, in all of our work, that two factors are of prime importance and of great value, namely, dissolved oxygen and oxygen consumed. The amount of oxygen required to oxidize the organic matter present in a water varies directly with the organic content, and as we see it, is a very satisfactory indication of the condition of the river waters of the central states where algal growth is slight and where, in a large measure, organic matter is present as a result of the introduction of sewage and manufacturing wastes.

The oxygen-consumed content of a strongly colored pond water, so aptly described by Thoreau as "meadow tea," is extremely high, but cannot be interpreted as indicative of pollution. If, however, the factor is determined upon a river water naturally low in organic content, a high value has a positive meaning. It, too, is a variable, being influenced by turbidity factors and by the rise and fall of the stream.

The dissolved oxygen content is equally helpful and is of special moment if considered in connection with fish life. This factor varies surprisingly under different conditions of flow, naturally being heavier below falls, rapids and rifles than in quiet pools.

In all of our work it has been our desire to take samples from the same points as frequently as possible throughout a season, thus eliminating changes in composition due to wind and rainfall. We have been able to do this in the study of lake waters where by the use of buoys we could locate sampling points to be visited daily during a period of many weeks. But in the case of river surveys where the work done has been carried on in a floating laboratory, it has not been possible to duplicate analyses except when anchored at important points. In our later work we have felt it more important to make long stops, and rapid runs between points of no special interest, rather than to take mile samples throughout the course of a river's flow. For instance, by stopping for ten days at any point above or below a city it is possible to gather a mass of data, which, for a period at least, represents river conditions rather accurately. A single analysis would not do this, for, as I have indicated, the disturbing factors are too great and are too constantly present to warrant any special importance being placed upon the results.

Bacterial studies carried on for a period give good average figures where a single count might be so high as to throw doubt, or so low as to give rise to undue confidence. Bacterial analyses taken throughout the course of

an extensive survey, even when determined in the routine of a day's work on samples collected at definite intervals of time and river flow, have definite value, at least when studied as a whole and not as individual counts.

In the light of our experience we have reached a conclusion, not yet definite, but nevertheless strongly grounded, that the only analyses of real moment, that is, the factors which should be taken on every sample and repeated every mile, are the oxygen consumed and dissolved oxygen, supplemented by a bacterial count, and the determination of the presence or absence of the colon bacillus. Occasional determinations of chlorine, nitrates, nitrites, alkalinity, free and albuminoid ammonia, are of just as great value in reaching final conclusions as a note book full of data subject to all of the errors and fluctuations to which I have referred.

In the analysis of isolated laboratory samples, which it is not possible to secure in duplicate, and which are usually sent in by some ten o'clock health officer who awakes to his duty only after typhoid has developed in the family, the routine water analysis so long employed and rigidly adhered to, can not be dispensed with. I hope it may be improved. I see no reason why the chemists of today can not improve over the methods of years ago just as they have improved analytical methods in all other lines of laboratory work. But I am strongly convinced that in routine work such as that involved in the study of stream conditions, in the character of a water supply, in the operation of a filtration plant, much of the work now being done may be omitted without in the least depreciating the value of the surveys or diminishing the sum of the evidence obtained.

THE ALASKAN ESKIMO.

THE PREVALENCE OF DISEASE AND THE SANITARY CONDITIONS OF THE VILLAGES ALONG THE ARCTIC COAST.

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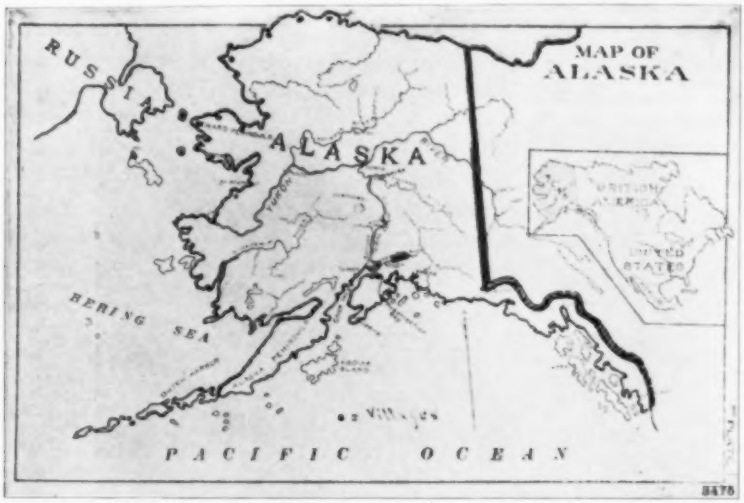
During the Arctic cruise of the U. S. S. *Bear* in 1913–1914 the writer, attached as medical officer to that ship, had the opportunity of visiting the Eskimo villages along the Arctic Coast and those on St. Lawrence, King, and Diomede Islands in the North Bering Sea. In rendering medical aid to these people, the opportunity to observe the diseases from which they suffer and to note the conditions under which they live presented itself.

The villages spoken of in this article are shown on the map here reproduced. In all there are fourteen, having a total population of about 2,200. Accounts of early explorers refer to these people as being healthy and robust



with little or no disease among them. Data collected by others has shown that those Eskimos living in isolated sections and coming into contact with the white man very little, if at all, are also free from disease to a very great extent. Today disease is always found to be more prevalent among those natives living near mining camps, whaling stations and trading posts, in spite of the fact that in these communities they will receive more and better medical attention. There seems little doubt that contagious diseases, with which these people are afflicted, were introduced by Europeans and Americans. Probably the first to mingle with the Eskimo were explorers,

then the whalers, traders, gold seekers and of more importance, that class of people that follow in the wake of such adventurers.

The Eskimos, like other aboriginal people, are peculiarly susceptible to the diseases of civilization, especially those we call children's diseases, and epidemics of these diseases have raged with disastrous results in several communities. In addition, the habits, customs and mode of living of these people are favorable to the spread of disease once it has been introduced.

The Eskimo, of course, is entirely ignorant of the modern conception of disease, its cause or treatment. He still clings to the old tribal traditions and customs in alleviating the sick and the prevention of disease. Each community has its "doctor" who, holding the natives through their natural superstition, continues to practice his "supernatural" powers. As an example, a native of King Island told me, through an interpreter, that the "doctor" in his village had completely relieved a severe pain in his chest by cutting his heart out, cleansing it and then replacing that organ. To substantiate his story he showed me a small linear scar about one inch in length just below the costal border involving the skin only. These practitioners probably have some hypnotic ability and a representative of the Smithsonian Institute who spent some time among these people informed me that he had observed such a performance.

Point Hope.

The Eskimo dwelling has a very important bearing on the health of these people. They are small, low-roofed, and, generally, part underground. The walls are thick and made principally of driftwood, earth, and stones. Ventilation is generally poor, though in some, if well cared for, it is satisfactory, being obtained by means of a hole in the roof and by the entrance. The floors are generally earth and are covered with skins. The sleeping quarters are sometimes partitioned off by a curtain made of the skins of different animals, though all the occupants sleep in a common bed. The dwelling is heated with a blubber or oil lamp, the smoke from which is very disagreeable and objectionable. This type is that used in general by the Eskimo, though different villages have their particular type of entrance.

Some enter by a small door; others have the entrance from the roof, entering by means of a ladder a small compartment which leads to the dwelling proper by a long low passageway. Two villages, those of King Island and St. Lawrence Island, have a type of dwelling entirely different from others and built to meet the particular needs in that location. Regardless of the type, they are all, as a rule, overcrowded, poorly ventilated and insanitary living quarters. The ordinary type of dwelling cannot be occupied the year around as with the thaw in the spring the walls drip, water collects on the floor and, fortunately for the native, he is forced to live an outdoor life for at least three months of the year. These he spends in a tent and the insanitary conditions of the winter house are temporarily avoided. The existence of any contagious or infectious disease in such living quarters renders the prognosis bad and the probability of transmission is increased.

The occupants sleep in a common bed and eat from a common pot as a rule. Meat, seal oil, blubber, often in a poor state of preservation; fur garments, hides and skins litter the room. Skins tanned by the native process are immersed for some time in urine and this is collected from time to time and stored in the house. Toilet articles are unknown except to a few who have come under the influence of a missionary or school teacher. Bathing is, as far as I could ascertain, a custom not yet adopted.

A Typical Eskimo Igloo.

Filth, waste and garbage is deposited where most convenient. In the summer, pools of water are the favorite dumping places. Skins, meat and fish are hung on large frames throughout the village. In some villages deep pits are dug into which great quantities of meat are thrown and stored for future use, the natives claiming that partial decomposition improves the flavor. The water supply, snow and ice during the winter and running streams or shallow wells during the summer, were invariably polluted with filth, waste, garbage, and in some instances, meat in various stages of decomposition was observed immersed undergoing the native process of curing.

The Eskimo has thrived for generations upon a diet composed of meat, oil and blubber. Of late years, with the coming of the white man, other

food supplies have been introduced, though most of the natives do not know how to properly prepare this food. The reindeer which were imported from certain parts of Russia for the Eskimos have been of great benefit, the skins being used for clothing and the meat for food. A certain percentage of these animals have, however, been found to be infected with the cyst of the T. ecchinococcus, and dogs which are so numerous and with which the natives live in intimate contact, have been found to harbor the adult stage of this parasite.

The disposition of the dead is governed entirely by local tribal traditions and customs. The bodies are sometimes placed in a crevice and stones thrown upon it, or buried partially underground. These customs have of late been altered with the coming of the missionary and they are interred in the same manner as in this country.

Interior of a native house showing skin curtain partitioning off the sleeping room and how furs, skins, etc., litter the room.

The portion of Alaska in which these people live is away from the ordinarily traveled routes. From a navigator's view it is dangerous cruising. The charts are poor, harbors few, and landings are made with difficulty. In addition the sea is free from ice only a small part of the year. Under such conditions it was impossible to make a routine examination of the natives. The table below, however, shows the diseases which were met and I think are representative on a whole of the state of health of these people. The death-rate during the year 1913 was 31 per 1000, and the birth-rate 45 per 1000, this being computed from data furnished by the Department of Education, and while not being absolutely accurate, gives a fairly close estimate on the status of these people.

Of the 281 cases to which medical relief was afforded, there were:

Diseases of the Eye:	
Interstitial keratitis	20
Blepharitis, with ulceration, ectropion and trichiasis	30
Conjunctivitis (all varieties)	10
Blindness, traumatic	3
Blindness, snow	2
Eczema of lids	1
Ophthalmia	2
Strabismus	1
Cataract	7
Pterygium	10
Atrophy of optic nerve	1
Iritis	2
Stricture of lachrymal duct	2
Corneal fistula	1
Chemosis	1
Congenital malformation of lids	1
Trachoma (?)	1
	95
Diseases of Respiratory Tract:	
Tuberculosis of the lung	24
Acute bronchitis	16
Acute pleurisy	2
Pneumonia	2
	44
Venereal Diseases:	
Syphilis	6
Gonorrhœa	1
	7
Tuberculosis:	
Lungs	24
Bones	11
Joints	10
Glands	8
Skin	1
General	1
	55
Gynecological:	
Disordered menstruation	3
Abortion	1
Laceration of perineum	2
Ovaritis	1
	7
Diseases of the Nervous System	
Hemiplegia	2
Paraplegia	1
	3

Congenital Defects:	
Cleft lip and palate	2
Umbilical hernia	1
Malformation of the eyelids	1
Dwarf—malformed limbs	1
	5
Muscular System:	
Rheumatism	12
Diseases of the Joints:	
Tuberculosis	10
Rheumatism	5
Chronic dislocation	1
	16
Diseases of the Skin:	
Tuberculosis	1
Favus	1
Impetigo Contagiosa	26
	28
Abnormal Growths:	
Epithelioma of the penis	1
Diseases of the Circulatory System:	
Valvular disease of the heart	1
Diseases of the Gastro-Intestinal Tract:	
Chronic gastritis	10
Acute gastritis	8
Ptomaine poisoning	5
Prolapse of the anus	1
Enterocolitis	12
Malnutrition (infants)	5
	41

U. S. R. C. *Bear* in Arctic Ice, August, 1913.

RELATION OF PUBLIC HEALTH TO RACE DEGENERACY.

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Read before the General Sessions, American Public Health Association, Colorado Springs, September, 1913.

The service which has been rendered the human race by the public health movement of the last half century is the noblest example afforded by human history of successful, philanthropic, human activity. Within the last fifty years the average length of life in this country has been increased about seven years. In Europe, the increase has been considerably greater. It is safe to say that public sanitation has within recent years added to the lives of the present inhabitants of the civilized portion of the globe not less than four billion years of human life. Using Finkelberg's estimates and others we may conclude that human life is at the present time being increased at the rate of sixteen or seventeen years per century and that the rate of increase is increasing, having gradually moved up from four in the seventeenth and eighteenth centuries to nine in the first part of the nineteenth and nearly double this rate in the last half of the century.

This marvelous beneficence, the proportions of which far exceed those of any other boon conferred by science upon humanity, has resulted from a prolonged succession of triumphs achieved by man in recent times, in his age-long battle against the enemies of life and health. What these battles were and how they were won it is quite unnecessary to recount in the presence of an audience so familiar as is this with all the details of modern sanitary progress. The chief purpose of this paper is to call attention to the remarkable fact that, notwithstanding the enormous saving of human life which has occurred in modern times and the doubling of the average length of life within two centuries, there has been going on at the same time a remarkable depreciation in racial vitality and stamina.

That the human race, or at least the civilized portion of it, is degenerating at a rapid rate, has been strongly suspected for a long period of time. Numerous writers within the last fifty years have called attention to the evidence of race deterioration and a few years ago the British government appointed a commission, known as the British Interdepartmental Committee on Physical Deterioration in Great Britain, which was charged with the study of investigating this question in the British Isles. The committee conducted a careful inquiry extending through several years, in the course of which testimony was taken from all classes of persons likely to be able to throw any light upon the subject, particularly physicians, sociologists, magistrates, scientists, clergymen and military officers.

The voluminous report published by the committee presents a large number of facts of great significance, many of which indicate that race degeneration is actually taking place in Great Britain. It is stated, for example, on page 177 of the Report, that in Manchester and other manufacturing districts, evidences of degeneration are very marked. There is a distinct depreciation of stature. In Manchester and Salford it has been found necessary to import men from the country to act as policemen, as a sufficient number of men large enough to serve in this capacity cannot be found in the districts named.

An army recruiting officer testified that 60 per cent. of the young men offering themselves for military duty were rejected on account of physical unfitness, and this notwithstanding the fact that the standard for admission to the army has been reduced within the last sixty years from five feet six inches to five feet. In the examinations for admission to the army, it was found that out of every thousand applicants, nearly six hundred fell below the old standard, and more than half had a chest measurement of less than thirty-four inches, the minimum standard of forty years ago. It was found also that, notwithstanding the great reduction in the height standard, the proportion of persons rejected because they were too short was not decreased.

Statistics gathered by the British Association for the Advancement of Science show a decrease of one inch in the height of adult men in the last quarter of the last century. Many persons who testified before the Interdepartmental Committee presented evidence of physical deterioration among the English people in various directions.

Professor Rubner, in an address before the late International Congress on Hygiene held at Washington, D. C., intimated his belief that the human race is deteriorating, and suggested that a given number of people, five or ten thousand for example, would be found to weigh less in the aggregate at the present time than the same number of people weighed a generation ago.

Within a few months, Doctor Tredgold, an English authority of high repute, medical expert of the Royal Committee on the Feeble-Minded, and well known for his studies in eugenics, recently contributed an article to the *Quarterly Review* in which he presented most conclusive evidence of a distinct "decline in the vitality of the English people and growing sickliness." Professor Tredgold calls attention to a fact which has apparently been generally ignored by sanitarians, viz., that average longevity is not a correct measure of race vigor. Says Tredgold: "It would be extremely fallacious to conclude that a diminished death-rate is any indication of an increased power of resistance to disease and an improvement in the inherent vitality of a race."

For more than thirty-five years the writer has maintained the same proposition, insisting that a high degree of race vigor is indicated by the attainment of great age by a large proportion of the members of a community rather than by a high average longevity.

Statistics gathered by Tredgold from various friendly societies, aggregating a membership of nearly a million and a half, demonstrate that, notwithstanding the great advance in the prevention of disease through public sanitation and improvements in therapeutics, the average amount of sickness at all ages, has steadily increased during the last half century. The following table taken from the report of actuaries, appointed in connection with the National Insurance Act recently enacted by the British Government in 1911, shows the increase of sickness which has occurred during the last thirty years in several large friendly societies:

SICKNESS PER ANNUM PER MEMBER IN WEEKS

(Male lives)

Taken from the Report of the Actuaries Appointed in Connection With the National Insurance Act of 1911.

Ages.	Manchester Unity 1866–70.	Manchester Unity 1893–97.	Ancient Order of Foresters 1871–75.	Friendly Societies. 1876–80.
16–19	.54 (78%)	.92	1.04	.88
20–24	.75 (20%)	.90	.82	.85
25–29	.81 (17%)	.95	.85	.87
30–34	.93 (14%)	1.06	.97	1.02
35–39	1.06 (20%)	1.27	1.15	1.24
40–44	1.26 (25%)	1.58	1.37	1.47
45–49	1.64 (21%)	1.99	1.71	1.89
50–54	2.22 (24%)	2.75	2.27	2.39
55–59	3.05 (31%)	4.02	3.21	3.36
60–64	4.72 (34%)	6.31	4.58	5.17
65–69	7.24 (46%)	10.59	7.97	8.73

A study of this table shows a very marked increase of sickness at all ages of life, from sixteen to seventy years, ranging from 14 per cent. to 70 per cent. the greatest increase being at 16–19 years and the next greatest 55–69 years.

Tredgold also shows that the decline of the death-rate in England has been confined to ages under fifty. Rittenhouse, Fisk, and others who have made studies of this subject from the best statistics obtainable in this country, have shown that within the last thirty years there has been

a very pronounced decrease in the life expectancy of men over forty to forty-five years of age.

The report of the United States Census Bureau is a mine of most interesting and valuable information on this subject. A study of these reports brings out the important fact that the notable increase in the average longevity, which has occurred within the last two or three centuries, is solely the result of the suppression of acute maladies in infants and adults. This is clearly shown by the fact that right along with the decrease in acute maladies of various sorts, there has been a steady increase in the mortality rate of most chronic maladies.

It is apparent then that while public sanitation has accomplished work of inestimable value in certain directions, it has not as yet accomplished all that could be desired. It may be profitable to consider some of the things which public sanitation has failed to accomplish.

1. While lessening the mortality rate of acute diseases, almost without exception, public sanitation has utterly failed to lessen the mortality from chronic diseases. Chronic maladies and degenerations of all sorts are clearly shown by each annual report of the Census Bureau to be increasing and not at a slow and uncertain rate, but at a surprisingly rapid rate. For example, within the last ten years the mortality from heart disease has increased over 50 per cent.; the mortality from arteriosclerosis has increased from 6.1 per thousand in 1900, to 21 in 1911, an increase of nearly 250 per cent. According to the Census report, nearly four times as many people die from disease of the blood vessels today as a dozen years ago. Doubtless this showing of the Census Bureau is in some part the result of increased accuracy of diagnosis and increased attention given to blood pressure and the diseased conditions of blood vessels in recent times.

The mortality from Bright's disease in the United States has increased 151 per cent. within the last thirty years, as shown by Rittenhouse. The mortality rate from diabetes, in spite of great improvements in the treatment of this disease, has in the last dozen years increased 50 per cent. The mortality from appendicitis and acute maladies chiefly dependent upon chronic infection of the colon, in spite of the great number saved by surgical intervention, has increased more than 20 per cent. in a dozen years.

Mr. Rittenhouse, the able expert of the Equitable Life Insurance Company, has shown that the mortality from chronic disease in general has doubled within thirty years. When we consider the fact that chronic disease kills half the people who die, or about seven hundred and fifty thousand people annually, it is evident that public sanitation and the efforts of health boards, and federal, state and municipal health authorities and agencies connected with public health administration, have made no progress in controlling those causes of mortality which are respon-

sible for half the deaths which annually occur in this and other civilized countries.

The significance of this failure appears when we consider that half the deaths from chronic disease which occurred last year, for example, would not have occurred if the people of the United States were as healthy as they were thirty years ago. That is, that the causes of chronic disease, whatever they are, have increased or multiplied to such an extent within the last thirty years that we are losing not less than three hundred and seventy-five thousand persons in this country alone each year from causes which are certainly preventable since they either did not exist or were only half as active thirty years ago as at the present time.

Is it not the duty of state and national boards of health and of all health authorities to undertake to combat this rising tide of mortality from chronic disease and to save some of the four millions who, at the present rate, are certain to die unnecessarily from these causes within the next decade? Is it not just as much within the province of a board of health to endeavor to ascertain and to suppress the causes of Bright's disease, diabetes, arteriosclerosis, cancer, pernicious anemia, heart disease, hepatic sclerosis and other chronic maladies as to seek to control yellow fever, typhoid, small pox, diphtheria and other infectious maladies? The increasing death rate of cancer, diabetes, Bright's disease and other chronic maladies is most alarming evidence of a decline of race stamina and calls for a vigorous effort to stem this tide of degeneracy.

TABLE SHOWING INCREASES AND DECREASES IN LIFE EXPECTANCY BETWEEN 1880 AND 1910. (RITTENHOUSE)

Ages.	Death-rate, 1880.	Death-rate, 1910.	Decrease and increase in rate.	Per cent. of same.
All	17.63	15.80	−1.83	−10.38
Under 30	16.3	11.3	−5.0	−30.6
30–34	9.12	6.99	−2.13	−23.3
35–39	10.1	8.90	−1.20	−11.8
40–44	10.20	10.95	+.75	+7.35 (5)
45–49	12.20	13.79	+1.59	+13.0
50–54	13.70	18.35	+4.65	+33.9
55–59	20.49	24.28	+3.79	+18.5
60–64	25.69	34.85	+9.16	+35.6
65–69	40.5	53.16	+12.66	+31.2
70–74	55.4	75.96	+20.56	+37.1
75 and over	123.68	143.66	+19.98	+16.1
Above 40	25.10	30.42	+5.32	+21.20
Above 50	35.24	44.07	+8.83	+25.06
Above 60	53.81	67.73	+13.92	+25.87

2. While the death-rate has been increasing, there has been a simultaneous decrease in the birth-rate. In several civilized countries, the birth-rate is decreasing more rapidly than the mortality rate. In France, the birth-rate has actually fallen below the death-rate, so that the native population is actually dying out. In England, within recent years, the birth-rate has decreased so rapidly that it has now almost reached the death-rate, so that the population of Great Britain will soon be stationary. The birth-rate is rapidly declining in almost every civilized country of the globe as shown by the following table:

DECREASE OF BIRTH-RATE BETWEEN 1880 AND 1902.

Countries Showing a Decreased Fertility Rate.

Country.	*Decrease per cent.*
New South Wales	30.6
South Australia	28.0
New Zealand	24.5
Victoria	24.2
Western Australia	23.9
Queensland	23.2
United States (estimated)	20.0
Belgium	19.8
France	10.7
England and Wales	17.7
Scotland	12.7
Denmark	9.8
The Netherlands	9.5
German Empire	8.4
Sweden	8.2
Switzerland	6.4
Norway	3.7
Italy	2.5

The registrar-general of Great Britain states in his annual report for 1907, "At the last census period, the fertility of English wives was lower than recorded in any European country except France." A reference to the above table will show, however, that in the United States the birth-rate is diminishing more rapidly than in any other part of the world, with the exception of Australia and New Zealand. The fact appears that the fertility of American wives is decreasing at the rate of 10 per cent. a year. If this decline in the birth-rate is due to physiological incompetence it is a direct symptom of racial decay. If it is voluntary it is an indirect sign of racial decay to the extent at least that those fit for motherhood shirk its responsibilities and so fail to contribute their quota of vitality to the next generation. In my opinion the decline is chiefly due to the former cause.

An eminent member of the Royal College of Surgeons testified, before the English Committee on Physical Deterioration in Great Britain, that sterility was unquestionably increasing among the English and cited this as an evidence that race deterioration was taking place.

Closely akin to this growing loss of fertility in women is the rapidly increasing inability of women to nurse their infants. According to Holt, "In New York, at least three children out of every four born into the homes

of well-to-do classes must be fed at some other fount than the maternal breast." A professor of entomology, of the University of California, finds an analogy between the human race and bees, ants and some other insects. He insists that the increasing number of women who have lost both the instinct and the capacity for motherhood is evidence that there is developing in the human race a neuter type corresponding to the worker class among bees and ants. In certain parts of the United States the decay of the native population as shown by diminished fertility is far advanced. For example, among native-born New England wives the average number of children is only 2.7, while foreign-born wives living in the same communities have an average of 4.4 children.

In the decrease of the birth-rate and the increase of incompetent mothers, we are face to face with a race disease which must inevitably end in what Mr. Roosevelt termed "race suicide," and is unmistakable evidence of race degeneracy. What have national, state or municipal health authorities done toward investigating the causes of this unmistakable and growing evil which threatens disaster to the race?

3. State boards of charities and special commissions have, within the last forty years, so greatly improved the conditions under which the insane and other mental defectives are cared for that the death-rate of certain of these unfortunate classes has actually fallen below that of the general community. At the same time, nothing has been done to check the development of these defectives and so they are increasing in proportion to the sound part of the population. Mental defectives have increased within the last fifty years at the rate of 900 per cent. in a century. That is, at the present rate of increase, in one hundred years from the present time, 9 per cent. of the total population will be insane, idiotic or imbecile. According to Doctor Davenport, mental defectives now constitute 1 per cent. of the total population. The recognition of a new class of mental defectives, the moron, gives us the key to a large number of social problems and explains the rapid increase of a certain type of criminals and the growing army of ne'er-do-wells. Of all classes of mental defectives this class is by far the most dangerous because not easily recognized except by experts, and so left to reproduce and increase without restriction.

A careful study of the situation in New Jersey, conducted under the supervision of Dr. C. B. Davenport, a few years ago, suggests the estimate that the feeble-minded class has doubled in that state within a single generation. Mental defectives are increasing in some countries and certain parts of this country at a most alarming rate. For example, the population of England and Wales has nearly doubled since 1860, while the number of insane has increased from 36,000 to 130,000. In France, the insane population has increased more than ten times as rapidly as the sane. In Prussia, the population has increased in thirty years less than 50 per

cent., while insanity has increased from 20,000 to 98,000 or nearly 400 per cent.

An eminent English alienist recently made the assertion that the whole human race will in time become insane. The writer does not share this pessimistic view for, notwithstanding the fact that at the rate at which mental defectives are at present increasing, the whole race would become insane, idiotic or imbecile within less than three centuries, so sad a calamity is not likely to befall the human family, for long before the race reaches the state of universal incompetency, the impending danger will be appreciated, the cause sought for and eliminated, and, through eugenics and euthenics, the mental soundness of the race will be saved. Is it not high time, however, that every state board of health and every other health official became enlisted in an effort to erase and eradicate this blot upon the brain which is so rapidly over-shadowing the race?

4. One of the most remarkable achievements of public sanitation is the reduction of infant mortality, but a study of vital statistics shows that the reduction in death-rate of infants is chiefly due to the improvement of public milk supplies and a spread of knowledge of the care of infants. Tredgold shows from the returns of the registrar-general of England that the number of infants that die from "innate defects of constitution" in each 1,000 children born is quite as great as fifty years ago, and this notwithstanding the fact that the total death-rate of infants has been reduced one-third.

When we add to this the fact that a great number of feeble infants that formerly died soon after birth, lacking vitality to live under existing conditions, are now kept alive by scientific feeding and intelligent care, it becomes evident that the proportion of feeble infants and weakling adults must be steadily increasing. It is evident that there is a growing blight on the baby crop. If the same situation existed in relation to the corn crop or the pig crop, federal and state authorities would give themselves no rest until the cause was found and removed. A large number of these weaklings live to reproduce their kind.

Here is another indubitable evidence of race degeneration and a field open for thorough-going research and earnest work on the part of health authorities everywhere.

5. As a natural consequence of the increased number of defective babies, we have a growing army of defective children. Our schools are filled with defectives of various classes. According to Doctor Wood of Columbia College, New York, a nation-wide investigation of the children in the public schools of both city and rural districts shows that of the 20,000,000 children in the public schools at present:

1,000,000 have flat foot, spinal curvature, or other deformities sufficiently grave to interfere with health.

1,000,000 have defective hearing.

5,000,000 have defective vision.

6,000,000 suffer from malnutrition.

10,000,000 have defective teeth.

6,000,000 have adenoids, enlarged tonsils or cervical glands needing attention.

15,000,000 children, or three fourths of the whole school population, have physical defects sufficiently grave to require attention and to seriously threaten health, usefulness and even life in later years.

What would a farmer think of a flock of sheep in which three fourths of the lambs were defective, or a herd of cattle three fourths of which showed deformities, decayed teeth or other unsoundness?

We have improved our horses and cattle till they are the finest that the sun ever shone upon. We have improved our dairy cattle until their capacity for producing milk and butter is almost beyond belief. We have improved our hens and our hogs to an amazing extent. Man has improved every creature he has redeemed from the forest and the plain with the exception of himself. Himself he has neglected until race degeneracy has become a certainty, and race extinction a possibility.

Should those who are the official custodians of the health of the people sit quietly by and see this process of race destruction going steadily on? Should not the work of boards of health include the work of discovering and eradicating the causes which are blighting the vitality and vigor of the race in the early years of life?

While the average length of life has been increasing in all civilized countries within the last three centuries, the proportion of centenarians to the total population has been diminishing. At the present time the most highly civilized nations have the smallest number of centenarians, while the largest number is found among those people who still adhere most closely to the simple life. The Bulgarians, a people numbering only five million, boast of 3,000 centenarians, or one in 1,700. In Spain, the proportion is one to 40,000; in France, one to 190,000; in England, one to 200,000; in Germany, one in 700,000. We have in this country one centenarian to every 25,000 of the population, but the number is rapidly decreasing as the natural result of the increased death-rate after middle life, due to the increasing mortality from chronic disease.

Centenarianism is rapidly going out of fashion. The rapid decrease of the proportion of persons of advanced age in all civilized lands is a certain indication of racial decay. The human race may be likened to a tree which is dying at the top. Why should not boards and departments of health, state and national, make it a very essential part of their work to inquire into the nature and causes of the maladies which are destroying the capacity of men and women to live out the normal span of human life?

Public health work has not only failed to prevent race degeneracy, it has actually tended in some ways to accelerate the rate of decay. Acute maladies and adverse conditions of life are a natural means of weeding out weaklings and securing the survival of the fittest. Public health work, through quarantine, protection of water supplies, and improving the general environment of human life, has in a large measure set aside this great biological law. It is no longer the fittest alone that survives, but also the feeble individual who is afforded sufficient protection. The preservation of these weak and unfit individuals decreases the average death rate, but at the same time decreases the average stamina of the race. Through heredity, weak strains are established which must corrupt and depreciate the stronger ones more and more from one generation to another.

Public health work must then inevitably tend to race depreciation, unless it concerns itself with the improvement of the weaklings which it preserves, and with the prevention of the propagation of incurable defects.

As regards the question, what can boards of health and public health officials do to check these evil tendencies which threaten the existence of the race, I am not prepared to lay down a complete program. This would involve far more wisdom and experience than I possess, and perhaps more than the world possesses at the present time. I venture to offer a few suggestions of things that need to be done to check race degeneracy and to make for race betterment.

1. First of all, there ought to be set on foot a nation-wide movement to secure trained and cultivated men for every position involving the responsibility of health administration. The present situation is absolutely intolerable. The health of men and women in the United States receives far less attention and consideration than does the health of swine, poultry and other domestic animals. The men charged with the custody of the public health, especially in small towns and rural districts, are, in many instances, far less well qualified for their tasks than those who have supervision over live stock.

2. There should be such thorough-going coöperation between boards of health or health officials and boards of education that every school and every pupil attending every school may have the full benefit of the latest and the best knowledge with reference to health preservation.

3. A campaign of education should be pushed so vigorously that every man, woman and child in the whole United States may be in the shortest space of time made acquainted with the general principles of eugenics and right living by means of moving picture exhibitions, educational plays, and the methods and effects of food contamination and adulteration should be graphically displayed. Up-to-date methods of dairying, the care of foods in the market, the store and the home, wholesome methods in the preparation of foods and all that pertains to nutrition should be

made clear to the simplest mind by moving pictures and other means. The evil effects of alcohol, syphilis, opium and other drugs, the deforming effects of wrong habits in sitting, and other careless habits should be impressed upon the popular mind by popular demonstration and exhibitions, together with the effects of good habits, of the out-of-door life, of healthful sports, etc. Every community and every public school should be supplied with swimming pools, playgrounds, out-door gymnasiums, and other out-door study places, all of which should be under the supervision of trained directors.

The public will never supply these health advantages for children until made by education to appreciate the relation of a right environment and a natural life to vigor and efficiency. Through health conventions, health schools, parents' classes and various other means, this educational campaign may be carried on. The school nurse may not only inspect and care for children, but also visit the children's homes and thus become acquainted with their home conditions, improving the opportunity to give instruction to the parents.

We possess knowledge enough of euthenics and eugenics to create a new race within a century, if the known principles of healthful living and scientific breeding were put into actual practice.

We know that tuberculosis is a house disease. We are able to cure half of the cases of early lung tuberculosis by turning them out of doors. These facts have been known for many years, but still we continue to lose 150,000 lives annually from tuberculosis, and are developing a consumptive variety of man which already numbers several millions of narrow-chested, low-resistant individuals, destined to die early and through heredity, a constant menace to the welfare of the race. The white plague will never be controlled until we convince the average citizen of the necessity of breathing out-of-door air day and night, and of living in the open as much as possible and thus building his natural resistance to disease. Building laws should require provision in tenement houses and private residences of sleeping porches or other out-of-door sleeping arrangements. We are still troglodytes, and will degenerate and disappear like the cave dwellers of the remote past unless we return to the open air, our natural environment.

We know that alcohol is responsible for a very large proportion of the unfortunates who fill our asylums for the insane and the feeble-minded, and that its degenerative effects are hereditary. Should we not take an active interest in combating this well-recognized foe of the race in every legitimate way.

We are only too familiar with the appalling effects of syphilitic and gonorrheal infections upon the individual and upon the race; yet we leave the public in ignorance of the terrible facts which we possess, and have

made almost no effort to restrict infection by methods which have been found effective in controlling the spread of other infectious maladies. Our duty as custodians of the public health certainly requires that we should advise some means of registering and quarantining every discovered case of venereal disease and of preventing the extension of these vice diseases to the innocent through marriage and heredity.

Chittenden, Fisher, Folin, and others have shown the danger of an excess of protein and the advantages of a low protein diet. The farmers of Iowa and Minnesota and the agriculturists of Denmark have long made use of this principle in the feeding of swine and other domestic animals with most striking results. A few intelligent people have likewise profited by Professor Chittenden's discovery which, if generally put in practice, would unquestionably lessen the death rate 10 per cent. or more and would lessen the cost of living at least twice as much. The general public are still in bondage to exploded errors respecting human feeding, although the high and increasing cost of meat products promises to help along a much-needed diet reform.

Sherman, of Columbia, estimates that half of the people of the United States are suffering from lime starvation through the use of fine flour bread and an excess of meat and cane sugar, which contain practically no lime, while whole wheat contains four grains of lime to the pound, peas and beans 8 grains, and milk 16 grains. It is no wonder that three fourths of the school children have seriously defective teeth and other skeletal defects. The tooth brush will not stop the development of an edentulous race. Scientific feeding is the essential thing, and the people must be made acquainted with the fact.

Bunge and Hindhede have shown the evils of a meat and cereal diet through the preponderance of acids in these foods and have demonstrated the essential value of the alkaline salts found in fruits and green vegetables, and especially the potato—a food which, for other reasons pointed out by Rubner, is far better suited to be made a staple diet than is maize and most other cereals.

Combe and later investigators have shown the essential rôle played in nutrition by the vitamines of fresh foods which are largely or even wholly destroyed by cooking at high temperatures and hence the danger of feeding infants exclusively on sterilized milk, and adults on an exclusive diet of cooked foods. Our primitive ancestors were ignorant of the art of cookery. The necessity for food in the state in which nature provides it for our use still exists in the constitution of the race and it cannot be safely ignored. Conditions allied to scurvy are widely prevalent, and scurvy, itself, not infrequent, as the result of popular ignorance of this important biologic fact.

Cancer kills 75,000 persons in this country annually, one in twenty

of all who die, and tortures three hundred thousand victims all the time. One seventh of all women and one twelfth of all men over forty perish from this horrible malady. William has shown that cancer is confined to the civilized races of men and to domestic animals and especially high protein feeders. Cats and dogs are more subject to cancer than are human beings. Horses, sheep, bovines, and even swine are rarely affected.

Senn showed that appendicitis is unknown among the low protein feeders of Central Africa, and Lucas-Championier noted its rareness among the Arabs of Algiers and the inmates of asylums and prisons in France who have a low protein diet.

Huchard and other investigators have pointed out the influence of chronic poisoning due to errors in diet and drug habits in producing arteriosclerosis, a rapidly growing scourge in all civilized countries.

Metchnikoff of the Pasteur Institute, and Arburthnot Lane, an eminent London surgeon, have demonstrated the destructive role played by colon poisons as the leading cause of chronic disease. Metchnikoff finds the remedy in changing the intestinal flora by feeding friendly germs in buttermilk or otherwise; Lane removes the colon; but Tissier, a colleague of Metchnikoff in the Pasteur Institute, and the real originator of the friendly germ idea, suggests the more rational remedy, the adoption of a low protein diet, largely excluding animal proteins. That this may be safely done is now admitted by all physiologists.

Why should not the people be made acquainted with these and other facts which profoundly influence their physical life? Why should we wait for the slow diffusion of life-saving knowledge through desultory efforts and private initiative while more millions perish for lack of knowledge.

Why should we not have in every state, under scientific direction, experiment stations for the practical testing and demonstrating of the principles and methods of living evolved by scientific research or human experience instead of leaving the public to be misled by faddists or ignorant enthusiasts, or to invite and cultivate disease and degeneracy by habits born of the ignorance and superstition of the past?

Is not a legitimate and important part of the function of public health officials to collate the results of scientific research which bear upon personal as well as community health and to place these facts before the public in such ways as to command attention and to stimulate in every community the development of a sentiment of respect for the body as man's choicest possession and an ambition to preserve its integrity and to increase its powers not only for personal advantage in happiness and efficiency, but for the sake of generations to come and thus for the preservation and improvement of the race?

Acute diseases may be controlled by quarantine and public sanitation but chronic diseases are a home product. They are almost altogether

the result of vicious habits of living, departures from the normal conditions to which the human constitution is adapted, hence men and women everywhere must be instructed in the principles of eugenics and euthenics. Those who have had the good fortune to be well born should be instructed to live in such a way as to maintain intact their splendid heritage and pass it on to the next generation undeteriorated.

Movements of all sorts which seek to promote physical welfare should be encouraged and unified. Eugenics and euthenics should be magnified before the people until their paramount importance is appreciated and legislatures become willing to appropriate funds as liberally for these essential means of race betterment as they are now doing for the improvement of crops and farm animals through similar means.

Prizes should be offered for the finest families and the best health and endurance records.

Through state life insurance, the whole population should be brought under government medical supervision. By periodical examinations, the early beginnings of chronic diseases should be detected and thus arrested by timely instruction in regard to necessary changes in habits or occupations, and every such case should be made an object lesson by means of which relatives and friends should be influenced to adopt preventive measures in time to avoid the same maladies.

The new science of eugenics founded by Galton, supplemented by what has been called the science of euthenics, when they come to be comprehended and put into practical operation, will result in the creation of an aristocracy of health, in the development of a new race of men. Should not every board of health and official health agency be actively engaged in the battle against disease and degeneracy, in all its forms, chronic as well as acute? Why should this work be left to private initiative? Nothing could be more profitable to the state and nothing more prolific of satisfying results to those engaged in the effort than a thorough-going campaign for race betterment through sane living combined with scientific sanitation.

The establishment of a national department of health will provide a central bureau by which to unify the work and collate its results. Professor Fisher estimates that the application of present knowledge of hygiene ought to increase the average of human life at least fifteen years. Think what it would mean to the nations, to the world, if the average man lived 60 years instead of dying at 45. The addition to a single generation of one billion five hundred million years of life in this great and glorious country of ours is a goal well worth working for. It appears improbable, however, that such a desirable result can be reached by public sanitation alone. The increasing death-rate, after forty years, chiefly due to unphysiologic personal habits, will soon neutralize the effect of public sanitation, which has already nearly finished its greatest tasks, and can hardly

hope to exert in the future so marked an influence in life extension as in the recent past.

What is now necessary is that the individual man as well as the community and the domicile, shall be brought in harmony with the great biologic laws which govern human life.

What the world needs at the present time more than anything else is race improvement. If race degeneracy is to be arrested, it will only be accomplished by the development of a more resistant and better type of men—a tougher, more enduring man more capable of wrestling successfully with the problems of the twentieth century and the greater centuries to come. Boards of health and health officers have before them the opportunity to inaugurate and carry forward an education movement that will accomplish this.

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ON THE VALUE OF GASEOUS DISINFECTION.

In the discussion of the report of a committee at the recent meeting of the Massachusetts Association of Boards of Health there came a question as to the real value of gaseous fumigation of rooms and large spaces. The matter was one that had not been touched upon by the committee, its report being a general one on isolation and exclusion from school in cases of communicable disease. The question was from the floor and it became evident that some health officer wished to find something in the way of official expression to present to his home people support for the ideas that he held himself.

The point is a good one. It seems to be true that in the East many health officers are agreed on the low efficiency of fumigation of rooms as practised. The officials in some communities have practically discarded work of the kind. There is a conflicting mass of practice, despite which there exists the belief among many sanitarians that there is, in general, negligible value in the common procedure.

The health officer finds himself divided between his duty as he sees it and the somewhat costly process which the public insists upon. It is right that he should ask an expression from a source so authoritative that it will carry with the people, and for the benefit of such officers such expression should be set forth.

ON WASHING THE HANDS.

"Food, fingers and flies" has been in the past an excellent watchword of sanitarians. Today all research and all practice has been subdivided and it is worth while now to pay attention to individual factors that are here classed together. A modern watchword should be, "Wash the hands."

It is true that we do wash our hands some, but it is a practice that should be extended. The fingers touching everything and playing continually about the mouth convey to the lips whatever they may have collected. In the universal interchange of saliva, it is through the fingers very largely that the exchange is made. If the hands were washed frequently much of the exchange would be lost. And further, if the present idea concerning typhoid fever is to be accepted, its spread would be largely curtailed if people would wash their hands.

There is here a lesson that may be learned from the Hebrews. Following all bodily offices there is a little religious ceremony involving the washing of the hands, and this with other ablutions must count for much in the way of prevention.

One practice which seems worthy of place in the cleanliness of people is the washing of the hands after touching the shoes. The latter come into contact with whatever there may be of filth or infection on the pavement. This may be street, sidewalk, railway track or elsewhere. Washing the hands frequently is a sensible protective measure. In fact in those hospitals where the same nurse looks after different contagious diseases it is the chief reliance in preventing cross infection.

The city of Anderson, Indiana, has recently given a vivid example of what means Indiana health workers are employing to transform communities which have been passively waiting for health to be administered to them by the health officer, into communities alive to the necessity of active, united effort. Doctor Hurty of the Indiana State Board of Health, informs us that Anderson held a Public Health Day last month, and from his description of what occurred, the plan was very successful. The whole city was for one day induced to concentrate its entire attention on plans for the improvement of public health. The newspapers advertised the event widely;

four public meetings were held on that day; a unique parade was planned in which three thousand people participated; the moving-picture theatres showed films concerned with public health work, and the merchants filled their windows with public health displays. The plan of the day's program was such that no one in the city, from the somewhat interested to the totally indifferent, could avoid in some way having his ardor awakened.

The meetings attracted many casual spectators, as well as most of the citizens already interested in active health work. The parade could not fail to attract the attention of the indifferent. The store windows and moving pictures suggested means and methods of securing cleanliness.

The parade in Anderson was the central spectacle of the day. It had many novel and original features. One was a large fly, six feet long, with a skeleton astride, arranged as a "float" on a large automobile truck. On the truck was also a broken-down manure box, and a leaking, overfull garbage can, over which was a sign "The Birthplace of the Fly." Behind this float marched fifty boy scouts, who stopped every half-block to give what they called their "anti-fly yell." Many health officers may be reticent to adopt such spectacular methods, and, indeed, such methods might not be suited to every community, yet in innumerable places it seems that this is to prove the only effective procedure. This procession in Anderson gave unity and point to the whole day's program, and through its unique symbols cannot have failed to make a lasting impression on the spectators. Moreover it aroused that active, militant spirit, and feeling of combined strength which is such a necessary stimulant to organized effort.

There was another feature of Anderson's public health day which deserves special attention. Anderson set an example for the other cities of the state. The Mayor of Indianapolis and of seven or eight other cities accepted the invitation of the Mayor of Anderson to be his guest and take part in the exercises.

This suggests that in any state where there are a large number of small cities, all mutual rivals for commercial growth, as in Indiana, the health officers can make this friendly rivalry serve as an active agent in state-wide coöperation for the improvement of health conditions. To use the local newspapers for calling constant attention of the townspeople to the relative desirability of their own town and the neighboring town as places of residence is a resource which might prove very valuable to a progressive health officer. Superior or inferior health conditions might frequently be made the object of lively civic pride if their relation to the city's growth and commercial prosperity were pointed out.

Whatever else the public health day in Indiana showed, it indicated that the wide-spread national movement for public health is working in under the shell of indifference of almost every community, and is preparing the people for quick response to local stimulus when it is properly applied by the local health officer. Some such specialized local stimulus as was used in Anderson must be lurking in the life of every city, ready to be utilized. If you, as a health officer, find great difficulty in making headway in your work, the discovery of this stimulus may make your efforts a hundred times more valuable through the resulting coöperation of the people.

ALL THE TYPHOID OF A COMMUNITY FOR FIVE YEARS FROM A CARRIER THROUGH MILK.

H. W. Hill, M. B., M. D., D. P. H.,
*Director, Institute of Public Health, London, Ontario.**

Read before the Municipal Health Officer's Section of the American Public Health Association, Colorado Springs, September, 1913.

In March, 1908, an outbreak of typhoid fever at North Branch, Minn., was investigated by the writer, then acting as Epidemiologist for the Minnesota State Board of Health, under the secretary of the Board, Dr. H. M. Bracken.

North Branch proved to be a prairie village of 700–800 inhabitants, *i. e.*, of about 150 families, chiefly Scandinavian. It is about 40 miles north of Minneapolis, on the Northern Pacific.

Following the first step usual to us in the investigation of all epidemics of doubtful origin, every existing case was individually sought out and cross-examined. They proved to be as follows:

Name.	Sex.	Age.	Date of earliest symptoms.	No. in family.	Evidence as to contact infections.
1 Mrs. C. S.	F	Adult	End of January	5	No preceding sick associates.
2 Mr. G. H.	M	Adult	End of January	2	No preceding sick associates.
3 G. R.	M	15	February 1	4	No preceding sick associates.
4 G. R. 's sister	F	20	March 6	..	Five weeks' association with the sick brother.
5 V. P.	M	5	February 1	5	No preceding sick associates.
6 R. Pn.	M	12	February 15	5	No preceding sick associates.
7 R. Pn's sister	F	3	March 10	..	Three and one-half weeks association with the sick brother.
8 C. L.	M	12	" 1	8	No preceding sick associates.
9 C. L.'s brother	M	8	" 11	..	Ten days' association with sick brother.
10 E. A.	M	Adult	" 11	5	No preceding sick associates.

* Now Executive Sec. Minn. Pub. Health Asso., Old Capitol, St. Paul, Minn. (On leave of absence from the Institute of Public Health.)

A study of this list shows 10 persons sick; three only (No. 4, 7, 9) give a history of association with previous cases. Of these three, No. 9, if secondary to his brother, must have contracted the disease from his brother, in all probability during his brother's incubation stage. This is not very infrequent in my experience. The other two (Nos. 4 and 7) if secondary* contracted their infections during the fastigia of their respective infectors, as may easily be seen by comparing the dates of earliest symptoms.

Eliminating these three cases (Nos. 4, 7, 9) as practically proved secondaries, seven persons (Nos. 1, 2, 3, 5, 6, 8, 10) are left to be accounted for. These are the primary cases from the histories of which the primary routes of infection, and hence ultimately the primary source, must be deduced. The first point to decide is when did they receive their infections? Was there a single occasion on which all were infected or did the infection occur from day to day for some time?

The average incubation period of typhoid fever from date of infection to date of earliest symptoms is exactly two weeks. But if a single definite infection of a large number of people occur on a given date, the cases arising therefrom will not all take sick exactly two weeks later.†

The first cases will naturally be those who have the shorter incubation periods. But even in a very large number of cases, the extremes are not likely to be greater than about one week for the shortest, three weeks for the longest, always provided that the date of earliest symptoms (not the date of going to bed, or of calling the physician) is used for the calculation.

The North Branch primary cases, arranged by dates of infection, group themselves thus: four cases (Nos. 1, 2, 3, 5) were infected about the middle

*There is little doubt in my mind that these three cases were really secondaries; although it is evident from the dates of earliest symptoms of Nos. 8 and 10 that the primary source of infection of the primary cases was still operating at the time when the secondaries, if secondaries, must have received their infection. My reasons for considering them secondaries are based on the theory of probabilities—thus: about 25 families, representing about 125 individuals, constituted, as will be shown later, the total group exposed to the primary source of infection. Seven of the 25 families were affected in the course of the outbreak, constituting a little less than one third of the possible number; the unquestionable primaries (the first cases in the 7 families) seven in number formed one eighteenth of the possible number. These figures give, then, a measure of the likelihood of any one family or any one person being affected by the primary source.

The second cases in each family occurred in three out of seven possible families; and in 3 individuals out of a possible 34.

But *during the period when the second cases arose* (*March 6–11*) the primary source attacked only two new families out of a possible 20 (*i. e.*, those not yet attacked), thus involving only 2 individuals out of a possible 100 in these families. If now all the five cases, occurring at this time were from the primary source it would be hard to understand why the proportion of previously unaffected families attacked should be 2 out of 20, while the proportion of previously affected families attacked should be 3 out of 7 or over four times as great. (Taken as individuals, the group of 34 represented in the 7 families would have yielded 3 cases, as against 100 in the 20 families yielding 2 cases, which is again over four times the due proportion.)

Evidently some factor existed tending to make typhoid fever much more likely to occur in the one group than in the other—and evidently this factor was the presence of a previous case. In fact, it may be stated as a general rule that the danger of contracting typhoid fever from a case in the same house is several times as great as the danger of contracting typhoid fever from anyone of the ordinary public routes—water, milk, flies or food—which may be operating at the same time.

†See "Mankato Typhoid Fever Epidemic of 1908," *Journal of Infectious Diseases*. November, 1911.

of January; one (No. 6) about the first of February; one (No. 8) about the middle of February; one (No. 10) about the end of February.

It is therefore impossible to select any one date of infection which will give reasonable incubation periods for all of the cases. To assume that the infection in January which gave rise to the first four cases gave rise also to the others would be to assume incubation periods of four, six, and eight weeks for the other three, respectively. Hence to "satisfy the equation" we must search for a continuous or at least repeated, infection taking effect four times at intervals of approximately two weeks.

Who was the source of that infection and what was the route of transmission?* In a community supervised ideally from the public health standpoint, the infected persons, the only sources or possible sources of infection, would be known, listed, under guardianship. Should they infect any one, the development of the first case would be enough to precipitate an immediate "rounding up" of the "suspects," and the prompt discovery of why and how they or some one of them "fell from grace"—of why and how they or he broke the prescribed regulations sufficiently to cause such a disaster.

In the existing condition of affairs, however, we do not at first know whom to suspect, and the guilty party must be laboriously traced by discovering first the guilty *route* of infection and then following it back to its contaminator. This can hardly be done from the investigation of single cases and we must usually wait until there are several cases to work on in order to get data enough for deduction.

This *post hoc* method is the Sherlock Holmes method; but not half so practical or prompt as the regular police method, which consists in knowing the suspects, before hand, arresting them all, and making each prove himself not guilty if he can!

However, we are still in the Sherlock Holmes stage of public health epidemiology. Hence in most outbreaks of any infectious disease it is necessary to trace out the sources by careful deduction and reasoning, after the fact; not by foresight or knowledge before the fact.

In typhoid fever the possible routes are water, milk, food, flies and contact.

The general condition of these routes in the community and the particular conditions of these routes for each infected person, *at or about the date of infection*, must therefore be determined by minute, alert, patient enquiry, if the guilty route is to be found, and the infection traced to its source.

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*Source is used to mean the person (sometimes in some infectious diseases, the animal) in whose body the germs of the disease in question are living, growing, and multiplying and from whose body the germs breeding there are distributed to other persons. Routes of infection are the physical conveyors of the germs derived from these sources—the physical mechanism through which the transfer takes place.

These general conditions may be summarized for North Branch as follows:

Water: Almost every family in North Branch possessed its own well; this was almost invariably a driven well, consisting of a sand point, to which lengths of $1\frac{1}{4}''$ pipe could be connected one by one. The sand point being driven down with a maul into the soft soil, a vertical length of pipe is screwed into it and also driven down, carrying the sand point before it; another length is screwed to the first and this also is driven down; this process is repeated until the point reaches water, usually at 15 to 30 feet.

In North Branch, sand overlaid hardpan, the thickness of the strata varying a good deal.

Such supplies are common in Minnesota and usually yield water which is well-filtered from the bacterial standpoint, but shows a more or less high, if harmless, chemical pollution, the degree of chemical pollution depending on the number and form of the neighboring privy-vaults, manure piles, etc. Such wells cannot be driven, practically speaking, except in very sandy soils; and therefore such wells are practically speaking always safe wells. At all events the writer has never been able to trace typhoid fever or dysentery to such a well.

Milk: About two-thirds (100) of the total families (150) in North Branch obtained milk from cows kept by themselves or by their immediate neighbors; thus there existed about 75 such sources of milk supply, supplying one or two families each.

The other one-third (50) of the total families obtained milk from two dairies, both situated near the borders of the village but on opposite sides. These two dairies divided the trade pretty evenly, having about 25 families each. Both were quite ordinary dairies, operated as family affairs, not better or worse than the average.

Food: The supplies were the ordinary supplies of the ordinary Minnesota town.

Flies: These, in March, were of course absent.

Contact: The usual opportunities for contact infection existed, here as everywhere.

These general conditions being given, the problem was to see how the special conditions surrounding each patient at his date of infection relate to them.

The seven primary cases, classified by ages, showed three adults (Nos. 1, 2, 10); three boys of school age (Nos. 3, 6, 8); and one boy under school age (No. 5).

Some of the local authorities strongly suspected the school well, which supplied the village school and drew its water from soil through which passed the school sewer. But the school well could not account for the three adults, or the boy under school age, unless they had used the school well,

as at an entertainment. Enquiry eliminated any such entertainment, or other equivalent. Moreover, only the boys were affected. A school well used by the whole school would surely affect girls also; especially since, in this village, the school girls were twice as numerous as the school boys. Nevertheless, careful inspection of the school was made, and all children detained from school were looked up, lest any cases might be missed. Subsequent analysis of the water, not used however in arriving at the conclusions here recorded, showed the usual conditions for this kind of soil—high chemical pollution, with practically no bacteria present.

Were the private family wells the source? Leaving aside the fact that the wells in use in North Branch can hardly be polluted by design, much less by accident, the fact that each of the infected families had its own well would exclude this method, except on the hypothesis that each well had been separately infected at or about the respective dates of infection for the families concerned. This extremely improbable hypothesis was practically eliminated by the fact that previous typhoid was too rare in North Branch to supply enough separate infectors to infect each of the seven wells.

A common infection of all the wells through the common water bearing stratum would be quite possible in some soils, but not in sand. Moreover such an infection would not give a random distribution of a very few cases, but a grouped distribution of a great many. These considerations quickly eliminated the water.

Infection of a small scattered number of people might occur from a common social source if they met at a club, church, society, etc., but the people infected in this outbreak did not belong to any one "set"; did not attend the same churches; did not employ the same grocers; did not even know each other to speak to, despite the small size of the village. To determine this point, the usual plan was followed of going over the whole list of patients with each individual patient; thus securing mutual rejection or confirmation of relationships from each of the patients concerning all the others. This eliminated "Social Typhoid" through food or contact, visiting the sick, etc. Flies were eliminated by the time of year (March), leaving milk the only remaining solution.

It quickly became evident that although, at the time of investigation, the infected families had no common milk supply, at the respective dates of infection every infected family had been users of the milk of one dairy, designated here, P. Not a single infected family had at that time used milk from the only other dairy.

The situation was this—of the 150 families in the village, 25 only used P. milk. Of the seven infected families, all belonged to this group. Hence of the 77 separate possible routes of transmission through milk, only one fulfilled the essential conditions.

At this point Dr. Thomas Zeien, the M.O.H., and the oldest of the two

physicians in the village, called attention to the fact that in his seventeen years' experience in the village, there had been no native typhoid fever for the first twelve. During the remaining five years, however, to date, native cases of unknown origin had not been infrequent, occurring in small scattered numbers at considerable and irregular intervals.

A list of these cases was secured, and a visit made to the P. dairy, where it was compared with their lists of customers.

In brief, it developed that the P. family had arrived and begun the milk business in North Branch just five years before; that of the 21 private native cases which had occurred since, 17 were definite customers, 2 occasional or indirect customers; the remaining 2 might have been. The other dairy had not at anytime any of these families as customers. Of course all this pointed directly to a carrier connected with the P. dairy.

The P. family consisted of two brothers: one milked, the other delivered. They had no hired help, and no visitors except a sister. Their father, mother, another sister and a grandchild constituted the family. There was no history of recent typhoid in any one of these; the brothers who handled the milk had never had it; but the father, mother and both sisters had had it *twenty-two years before.*

Careful cross-examination showed that no one handled the milk but the brothers; but *the mother washed the cans.* She however seemed a reasonably conscientious and cleanly woman, and showed hot-water facilities, maintaining that she used the water scalding hot always.

Infection of the milk by flies from the outdoor toilet used by the, as yet, hypothetical carrier was not possible at this time of year; the nature of the soil and the distance of the toilet from the well eliminated possible infection of the milk through the water supply, used in washing, possible adulteration, etc. It became evident then that the mother was the only carrier who could "satisfy the equation."

The evidence was so conclusive that I at once forebade any further handling of the cans by the mother; promising to close up the business if another primary case developed on their milk route later than two weeks after the date of the order.

This investigation occupied one day and one half. Arrangements were made with Dr. Zeien to send blood for the Widal test from the whole family, and feces and urine from the mother. These were examined at the Minnesota State Board of Health laboratories by Dr. A. J. Chesley, now Director of the Division of Epidemiology.*

The urine and feces were negative; the mother showed a positive Widal. Shorthandedness in the laboratory prevented following the matter up further. Fortunately the logic of subsequent events completed the evidence,

*Since, Director of the Division of Preventable Diseases.

thus; owing to the general public learning indirectly the source of the outbreak, the family closed up the business and moved away within a month of the investigation. During the five years that have elapsed since, not a single case of native typhoid has developed, as contrasted with 21 cases in the previous five years. Thus the village has returned to the typhoid-free conditions it enjoyed before the advent of the P. family.

The intermittency of the infection, despite the continuousness of the mother's work on the cans daily for the five years can be explained by the probable intermittency of the discharge of the germs from her body, by the fact that she usually kept her hands fairly clean, by the fact that she generally did use scalding water. Only when the combination occurred of the existence of a discharge of germs, infection of her hands from it, failure to wash her hands well, and failure to scald the cans well, did infection of the milk occur.

The small number of persons infected each such time probably depended on the fact that, in scalding the cans, she practically washed her hands clean when doing the first of the lot, the others escaping; and also by the fact that the people of North Branch on enquiry were found to use milk very little for drinking, and chiefly for diluting coffee; also the prompt delivery of the milk lessened the opportunity for any possible development in the milk of the typhoid bacilli introduced into it. The other dairy at times bought milk from P. The escape of all of their customers shows that they happened never to buy an infected lot.

ANALYSIS OF COST KEEPING AS APPLIED TO MUNICIPAL MANAGEMENT OF STREET CLEANING.

F. C. Bamman.

Read before the Sanitary Engineering Section of the American Public Health Association, Colorado Springs, September, 1913.

The Acts of Congress approved March 2, 1911, making appropriations for the expenses of the District of Columbia for the fiscal year ending June 30, 1912, authorized the commissioners to perform certain work previously done under contract, namely, street sweeping and cleaning alleys and unimproved streets. As hand patrol work and street washing were already under municipal control, this Act enabled the commissioners to take over all street cleaning and also brought about the recognition of street cleaning as an engineering problem and the transfer of the Department to the Engineering branch of the service, under United States army engineers, and in direct charge of a civil engineer. One of the direct results of this change was the establishment of a modern cost keeping system which would allow the application of some of the principles of scientific management as well as show any saving or increase over contract cost.

The Street Cleaning Department in Washington is, of course, part of the District of Columbia machinery and subject to certain general rules regarding its operation. The cost keeping system, in an effort to conform with these rules and, at the same time, check with the accounting system, represents hardly an ideal system or one which can be adopted haphazard by another city. At the same time, it should be noted that a study of the reports from various cities, made in the hope of obtaining suggestions and ideas not only failed in this particular but also showed a surprising lack of uniformity in terms used and results obtained.

Our failure to find a model on which to base a cost keeping system for street cleaning required a painstaking examination of conditions in Washington, the development of a crude system based largely on common sense and the refinement of this system to the present satisfactory but not ideal or perfect system, representing almost two years' work.

As already noted, the cost keeping system was developed along the simplest lines, direct charges being made wherever possible and indirect items being pro-rated according to the easiest method. Three sets of unit costs are obtained. The first consists of the sum of those charges which are directly dependant on the foreman or gang, such as pay rolls, and is the working total, representing, as it does, those charges which admit of direct comparison. It is also of value in comparing with the former contract prices in Washington as the overhead charges are, to the city, practically

the same as under contract, the present foreman then acting as inspectors and the office force being about the same. This total added to the indirect costs such as superintendence, etc., gives a second total, of value in comparing local costs with those of other cities where these items are included, to which, for a third total, is added a theoretical interest on investment, depreciation, etc., for comparison with outside contract cost. These last totals are only computed annually, the first or working unit cost being compiled monthly.

Owing to the natural difficulties and problems arising on first taking over the contract work, it was not until September, 1911, that any detailed study could be made of the cost keeping records. It was found that the unit costs, as compared with contract prices, were lower for all classes of work except alley cleaning. Under contract, alleys were cleaned for 40 cents per thousand square yards, while the figures for September, under municipal operation, gave 43.3 cents. Special study was then given to the alley gangs and various experiments were tried, including the use of an alley machine broom, which, in October, reduced the cost of one gang $5\frac{1}{2}$ cents per thousand square yards. New schedules were arranged which, so far as practicable, eliminated dead travel and the various foremen were carefully informed of the success of their rivals. The average for April, 1912, showed a cost of 21.8 cents while the yearly average was 32.4 cents per 1,000 square yards or $7\frac{1}{2}$ cents less than the contract cost.

Another example, this time in machine broom cleaning, might also be given. The contract cost for this class of work was $22\frac{3}{4}$ cents and the September figures for the four municipal gangs ranged from 17.9 cents to 15 cents. This variation in cost was due principally to the difference in the equipment of the various gangs, the high gang having two sprinklers and five machines while the low gang had only one sprinkler and four machines.

The general opinion throughout the Street Cleaning Organization, previous to this cost record, was that the two-sprinkler, five-machine combination, was the cheapest as a much larger amount of area was covered. Experiments were begun of different combinations of sprinklers and machines with a view to finding, in connection with the cost keeping, the most efficient combination. Odometers were placed on the apparatus and the various combinations tried out. As a result, a uniform combination of one sprinkler and three machines was adopted for the entire city. The cost for April, corresponding to the 17.9 cents for September, is 15.5 cents while the minimum April cost is 12.2 cents, the average cost for the year being 16.2 cents or over 6 cents less than contract.

It was found that the two-sprinkler, five-machine combination was high in unit cost because of the non-productive sprinklers and that, while the machines were traveling about twenty-five miles per day, the sprinklers

were only making around fifteen. The four-machines, one-sprinkler combination, on the other hand, gave the lowest unit costs, the sprinkler charge being divided among four instead of three productive machines, but it was found that the sprinkler horses were traveling between thirty-five and forty miles per day in an effort to keep ahead of the machines, the latter traveling about twenty-five miles. The one-three combination, on the other hand, while slightly more costly than the one-four combination, reduced the sprinkler travel to about that of the machines.

As necessary adjunct to the cost keeping, profiles and records have been developed, all of which tend to efficiency in various branches and consequently affect the cost of the direct street cleaning. Such would be a comparison of the cost of running different makes of automobiles, the cost of feeding, shoeing, hostlery, etc., at the various stables, the relative efficiency of each stable and the livestock as a whole, the cost of manufacturing and repairing apparatus and supplies, the record of area cleaned and dirt collected by the white wings and the plotting of their relative efficiency.

As an example of the detail to which the system is applied, the following might be cited. The rubber brooms for the squeegee machines, as received from the factory, have the rubber attached to the wooden strips by means of small wire nails and leather washers. It was found more economical to make these brooms in Washington by employees of the department and accordingly leather washers were made from scrap leather. The cost records showed that the cost of these nails and washers averaged about three dollars per broom. This seemed very high and an investigation of the detailed cost showed that the principal outlay was labor. Sheet leather was then used instead of scrap and the cost reduced to less than two dollars, proving that it was cheaper to throw away scrap and use good leather, an apparent waste. Further experiments were then made with the idea of doing away with the washer entirely and at present, after trials of different combinations, a heavy galvanized nail with an extra large head is being used with satisfactory results, the cost per broom being about sixty cents.

As an example of the educational and competitive value of a cost system, the records of the street cleaning stables are plotted on profile paper and show the total horses, the number working, sick, convalescent, etc., and also the efficiency of the stable, this last being obtained by dividing the total number of horses by the number fit for work. The stable bosses are practical horsemen, not at all accustomed to clerical work or cost accounting. When municipal operations were started, it was necessary to purchase a number of unacclimated horses, a fact which, combined with the extremely hot weather, caused a good bit of sickness in the stables. Early in October, the above mentioned profile was developed and it was found that the average efficiency of the combined stables was about ninety per cent. and that instead of coming up during the cooler weather of September,

it even dropped as low as eighty-six per cent., the one stable being slightly better than the other. As the average cost of keeping a horse is about one dollar per day, it was an easy matter to show the foremen the effect of this low percentage on the direct street cleaning costs. At the same time the difference between the percentage of the two stables was brought out and the foremen asked for explanations. It was made plain, however, that there was no suspicion that they were derelect in their duty but, on the contrary, that they were working for the best interests of the department and would do their best to improve any conditions called to their attention.

The direct result of this conference was an upward trend of the efficiency curve, at times to the 100 mark and averaging about ninety-eight per cent. to date.

Similar action is taken whenever any matter is to be called to the attention of any foreman, whether shop, stable or field. The results of such a conference are very prompt and positive, especially so, as by this time the men realize that no reflection on their ability is intended and that the office is far better equipped than they to see defects and outline remedies.

It is impossible to show, without a mass of detail, involving blank forms, tables, etc., the innumerable ways the cost keeping system, directly or through data compiled as a result of cost keeping methods, has increased efficiency. Changes are being made daily and errors in judgment on the part of foremen or higher officials are found, at first very often but as a result of the education due to the study of such errors, only occasionally at present.

The principal advantages of such a system may be summarized as follows:

First. Gives the detailed cost for each gang, for each class of work or for any particular feature which may be under investigation, in such form as to admit of analysis of any variation in previous costs or comparison between similar details of other work, as well as showing the result in any change of method.

Second. Provides a means of determining the relative efficiency of foremen or laborers and provides a tangible record for educational purposes, giving in money the effect of any internal change in the make-up of a gang and means of competitive comparison between gangs.

Third. Gives records of intermediate costs such as stable, repair shop or office expense, in which the greatest possibility of saving lie, in terms which admit of comparison with other departments or firms as well as internal comparison between two units, such as two stables of the same department.

Fourth. Gives repair costs, which in time, will give comparison as to the relative efficiency of two similar pieces of apparatus of different manufacture as well as a check on excessive repairs, etc.

These represent probably the most important uses of the system as

developed at present. New applications are constantly coming up to create fresh interest and to keep the system alive. Often some new item will creep into a standard report, be investigated and result in a new train of thought and study, with increased efficiency and renewed interest, not only in the new features but necessarily in the routine which is required to develop the working figures.

In closing, a word of caution. The local system has been in operation about two years. During that time many changes have been made, not in principle, but in detail, and it is expected that others will be necessary. The Washington system, as a whole, will probably fit no other department in Washington nor the Street Cleaning Department of any other city. Cost keeping is necessarily a process of first, evolution, and second, elimination. This department has gone through the first and the question now is can we do without this detail or how may we obtain it with less effort?

The experience here has been that the best way to obtain satisfactory cost keeping data is to go slowly. Not to hire an expert for two weeks or two months to develop a system but to put someone in charge of the cost-development, have them read, study and investigate other systems and then develop that system best fitted to the particular needs of the work and educate the force to a proper understanding of the results obtained.

RECENT PROGRESS IN METHODS AND CHARACTER OF STREET CLEANING.

S. WHINERY,
Consulting Engineer, New York.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

There has been no radical or particularly notable advancement during the last few years in the machinery and methods of street cleaning in American cities. But no little progress has been made in improvements upon methods and appliances that have become standard, and their more efficient and economical use, in complying with the public demand for cleaner streets than had heretofore been tolerated, and in a more careful study and analysis of the business, especially with reference to detailed cost of the work, for the purpose of effecting economies.

MACHINERY AND APPLIANCES.

Since the advent of street-flushing wagons and horse-power squeegees, little that is new or novel in street cleaning machinery or appliances has come into use.

The flood of patents issued for street-cleaning devices continues unabated but these patents relate largely to details and disclose little of value for practical use. This is somewhat surprising in this land of inventors. Most of our street-cleaning apparatus is admitted to be more or less crude and unsatisfactory, and there would seem to be possibilities for material improvements, if not radical innovations. The application of mechanical power in the place of horse-power to street-cleaning work has received attention and has been tried in a number of cities, but the results do not seem to have sufficiently commended themselves to municipal officials to warrant their more general use at present. The operation of the present street-cleaning machines by mechanical power involves such practical difficulties that its successful use is somewhat problematical, but there would seem to be a useful field for it in the collection and transportation of street sweepings, especially where the haul is long.

Hand cleaning (patrol) appliances have not progressed much beyond the common hand-broom and scraper, though hand pick-up sweepers are in use in a number of cities and seem to be growing somewhat in popularity.

The application of the vacuum or suction principle to the picking-up and collection of street dirt is also being experimented with to a small extent. Such machines, if they can be perfected so as to do the work satisfactorily and economically, would have the great advantage of removing the dust from the street without resort to the use of large quantities

of water, which is a consideration of importance where water is scarce or high in cost.

Thoroughness and Efficiency.

There has been in the past few years a decided advance in the standards of cleanliness of streets demanded by the public and attained by the municipal authorities. This is noticeable both in the large, and in the smaller cities of the country. Not only are the main streets kept in a cleaner condition but the area of cleaning has been extended and more attention given to the proper cleaning of side and secondary streets, and particularly to outlying territory where the streets were heretofore cleaned imperfectly and infrequently.

In towns and the smaller cities, and the suburban section of the larger cities, where earth and broken-stone street surfaces prevail, the use of oil to suppress dust has greatly increased, and is now quite general. While this is not, strictly speaking, a street-cleaning process, it serves as an effective temporary substitute for cleaning and marks a revolutionary improvement in the comfort of using such streets, and eliminates the sanitary danger and the inconvenience and damage, from flying dust.

Much greater attention than ever before is now given to the promotion of efficiency and economy in this department of municipal work, and it may be said that while the quality of the service has improved, its cost has not, as a rule, increased in the full ratio of the increase in population.

Accounting and Analysis of Cost.

Perhaps the most promising and fruitful advance that has been made in recent years is the greater attention given to the study of the details of street cleaning and the keeping and analysis of more complete and itemized accounts. The older accounts and reports of street-cleaning departments were so barren in details that they were generally of little or no value to either the student or the practical man. Beyond a general statement of the receipts and disbursements and the division of the latter among a few general heads, and rough estimates of the quantities of materials handled, little information of real value was to be had from them. This is, unfortunately, still true of most printed reports, but in an increasing number of cities the accounts of the street-cleaning department have been revolutionized and expanded so that the total and unit cost of every important detail of the work may be ascertained and analyzed. This requires, of course, greater attention to the collection of exact data of quantities and costs, and involves no little additional expense, but it is becoming more and more appreciated that the money so spent is wisely invested, since the main reliance for increased efficiency and economy in this, as in most other lines of business, must be upon small savings in many details rather than upon any radical changes in methods and

machinery. The value of the results of practice and experience in other cities for comparative study is becoming more appreciated, and there is, therefore, growing up a strong demand for the general adoption of a uniform system of accounting, and for more complete and detailed printed reports of street-cleaning departments.

Some Problems That Are Receiving Attention.

Some of the important matters that have more recently, and are now receiving increased attention may be mentioned:

One considerable source of the dirt and waste that must be removed from the streets is commonly called street litter, consisting of miscellaneous wastes thrown upon the streets and sidewalks by those passing along the streets, or swept out of business houses and residences. Street littering is effectively prevented in most European cities by the rigorous enforcement of laws or ordinances prohibiting it. Most of our American cities have such laws and ordinances, but they are practically "dead letters." Spasmodic attempts have been made to enforce them in a number of cities but public opinion has not sufficiently sustained these efforts, nor have the municipal authorities, as a rule, made their enforcement practicable by providing an ample supply of receptacles into which such litter may be deposited.

In recent years, there has been renewed agitation of the matter by street-cleaning departments and by the more intelligent part of the public, and it is hoped that the time is not far distant when the necessary receptacles for litter may be generally provided by the municipalities, and the ordinances against street littering rigidly enforced.

An important step in this direction must be the collection of more complete and accurate data as to the quantity of such litter handled and the additional cost of collecting it when thrown upon the streets. In New York City the street-cleaning department has given attention to this matter and estimates that the additional cost thus imposed on the department amounts, approximately, to $270,000 annually. This very large sum could be saved to the city yearly by providing convenient receptacles for litter and then enforcing the ample ordinances already existing. European experience has proven beyond doubt that this may be done without imposing any serious inconvenience to the public.

When it is considered that this litter is handled by human hands or is swept out of residences and business places and is therefore subject to infection by disease germs, the sanitary importance of collecting and disposing of it as directly and quickly as possible is obvious.

The possible utilization of street sweepings in some way that will partly repay the cost of street cleaning is another matter that is receiving more attention than heretofore. The most promising outlook for such utiliza-

tion lies in the direction of filling low lands, or building up new and very valuable areas of land by filling in shore areas now covered by shallow water and at present not useful for any purpose. Contrary to the prevailing opinion, experience and investigation have shown that street cleanings free from garbage may, if properly handled in the dumps, be so used without danger to the public health and without serious inconvenience or offense to the public.

Street sweepings from paved streets contain very considerable quantities of valuable fertilizing elements, the value of which at the market prices of these elements, probably averages at least two dollars ($2.00) per ton of sweepings. The cost of transporting and handling the raw sweepings is usually too great to permit of their profitable use as fertilizers in the farming districts, but some satisfactory method ought to be, and probably will some time be discovered to profitably recover these fertilizing elements.

Attention is being urged in many cities toward preventing the large accumulation of dirt and débris, and the inconvenience and expense to street-cleaning department, caused by building operations. Custom seems to have given builders the idea that they have a right to deposit the waste from their operations upon the fronting streets and that it is the duty of the street-cleaning department to remove and care for it. A number of cities have taken suitable action in this matter and others will doubtless follow.

The removal of snow from the streets and its disposal is, in our northern cities, a matter that gives the street-cleaning department a great deal of trouble and anxiety. The service is usually required for only a few days each winter, but the prompt clearing of the streets when it does become necessary is a work of such magnitude and complication as to call for extraordinary measures and effort, and the unit cost of the work is necessarily so high as to call out unfavorable comment by those who do not understand the difficulties involved.

In recent years, the organization and preparation for this emergency work has received much attention and the service now rendered in many cases must impress any one conversant with the difficulties involved as remarkable and highly praiseworthy. In this work, the old and well-known methods and appliances continue to be used. Doubtless new and efficient machinery for the work could be devised but the cost of installing it and the very short time it could be utilized, makes it very questionable whether in the end it would prove a good investment. Theoretically, it is not impracticable to design apparatus to melt the snow on the street at a cost below that of loading it upon the wagons and hauling it away, but when it is considered that such apparatus could be operated for but a few days, at most, during the year, the cost of providing it would probably not be warranted.

UNIFORMITY IN ANNUAL REPORTS OF LOCAL BOARDS OF HEALTH.

FREDERICK L. HOFFMAN,
Newark, N. J.

Read before the Joint Sessions of Sections on Statistics and Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

The practical importance of uniformity in vital statistics requires no argument or discussion. All scientific conclusions are relative, and unless the facts for one locality are strictly comparable with the facts for another the utility of the information for each must necessarily be much less. Every study of some particular disease emphasizes the neglect of our municipalities to give due consideration to recognized principles of statistical practice in the annual presentation of the vital facts of the community. There is nothing more lamentable in our public health history than the apparent indifference on the part of those who prepare the annual reports to the following of long established and universally approved methods of presenting the vital facts of the community in the most conclusive and useful manner. In this respect our American cities are far behind the large cities of England for which the annual reports on health and mortality are models of their kind. At the present time it is practically impossible to make a precise and conclusive comparison of the health administration of one American city with another on the basis of local annual reports. Obviously, the first duty on the part of every health official is to make the statistical presentation of his facts conform to the established rules of statistical practice of the Division of Vital Statistics of the Census Office, and then if possible or desirable, add such additional information as may be called for by the needs or peculiarities of the local situation, for necessarily the census reports are limited to the more essential facts suitable for statistical presentation, and on account of limitations of space and the required brevity of the reports not much attention can be given to minor, but often locally quite important, details.

In an address on "Some Suggestions for Improvements in Vital Statistics," presented to the American Statistical Association in 1907, I had occasion to discuss in some detail the most urgent needs for reform in present-day methods, but it is regrettable that, as far as it is possible to judge, there is no tendency towards a material improvement, but in some conspicuous cases rather the reverse. In a somewhat similar address on "Municipal Vital Statistics," read before the Fifteenth International Congress on Hygiene and Demography in 1912, I again directed attention to what may properly be spoken of as a lamentable state of affairs which emphatically demands a much larger share of public consideration than the subject has received in the past. It is certainly not a matter of mere per-

sonal opinion as to how the vital facts of a given community shall be presented from year to year, whether in a varying form, or in an abbreviated form, so as to preclude the scientific and practical utility of the data for local as well as for general purposes. There is no more glaring contrast in any branch of the government of the municipalities of the United States and England than in the generally crude and more or less useless annual health reports of our American cities, and the thoroughly scientific and yet strictly practical manner in which the local health statistics are presented to the taxpayers of the counties and large cities of the United Kingdom. Uniformity in the reports is, therefore, of the utmost importance, but as yet the various suggestions which have been made to bring about the required reforms in this country have been to small purpose. Many of these suggestions in the past have indicated an almost complete failure to realize on the one hand the past efforts which have been made, and on the other the really practical utility which all vital statistics are obviously intended to serve. It would, therefore, seem that a new committee on uniformity in the annual reports of local boards of health should be appointed, and that the membership of such a committee should be selected with extreme care to secure more than perfunctory performance of duty. As is only too often the case, reports of this kind are prepared by some one reasonably familiar with the facts or interested therein, and the conclusions are approved by the majority. Unless, however, there is intelligent coöperation on the part of men thoroughly qualified for the work, the results will be again as barren in the future as they have almost always been in the past. Personally, I am a very strong believer in the practical utility of the annual reports of local boards of health, including an extended and thoroughly qualified analysis of the local vital statistics precisely coördinated to local public health problems. I am also strongly impressed with the great value of the reports as issued in the past, but I feel that much better results could have been secured, and as a matter of public duty should be secured, by means of easily obtainable improvements, chiefly in the direction of uniformity in the presentation of the facts of annual health experience. Our urban population numbers, according to the census of 1910, 49, 348, 883, so that the problem affects about 54 per cent. of the total population of the country. The task is not a difficult one, but the problem, for its successful solution, requires the intelligent coöperation of thoroughly qualified and disinterested men, and if such a committee as is here suggested is appointed, its membership should be selected by the chairman with the greatest possible care. The work of such a committee should be coördinated to the efforts of the recently formed Central Committee on Coöperation in Public Health Agencies, of which Mr. John M. Glenn is the chairman. The committee should take into the most careful consideration the reports as at present published by the larger cities throughout the world, so that its final recommendations may represent the highest ideal attainable at the present time.

THE PERIOD OF INCUBATION OF DIPHTHERIA CULTURES.*

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Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

The need of giving a report on diphtheria cultures as quickly as possible is appreciated by all. Although a five to eight hour period of incubation is frequently all that is necessary to secure a sufficient growth of diphtheria bacilli so as to be to give a positive diagnosis, there are many cultures that require a twelve to fifteen hour incubation and, as was shown by Slack and Arms at the 1908 meeting of this section, reincubation and reinoculation of typical diphtheria cultures incubated for fifteen hours is often desirable.

When the examining staff is limited to such size that only one examination of a culture can be made, I think it may be said that a twelve to fifteen hour period of incubation should preferably be chosen. Such a rule can be much more readily carried out in city laboratories which receive most of their cultures late in the afternoon than in state laboratories which receive most of their cultures early in the morning. Thus about 90 per cent. of the cultures which reach the state laboratory in Iowa are received before 9 o'clock in the morning. They are immediately entered on our record book and placed in the incubator. The tubes are given a naked-eye inspection at 5 o'clock in the evening. Those that present evidence of growth are examined microscopically at that time; the remainder and also those examined microscopically in which the growth was not sufficient or in which suspicious forms were found are placed back in the incubator and examined the following morning.

During the warm months, *i. e.* from about June 15 to September 1, we find that it is possible to make the final microscopical examination late in the afternoon of the same day that the specimens are received, in about 90 per cent. of the cases. Indeed, about 75 per cent. present a visible growth at the time they arrive at the laboratory.

During the colder months, however, we find that very few present a growth at the time they are received and that only about 16 per cent. present a visible growth late in the afternoon of the day they are received *i. e.*, after an incubation of about eight hours.

The purpose of the investigation on which this paper is based, was to determine whether or not it was worth while to examine our diphtheria cul-

*(A study made to determine whether or not it is worth while to make examinations of cultures at 9 o'clock P. M. after an incubation of twelve hours.)

tures at 9 o'clock in the evening, *i.e.*, after a twelve-hour incubation, in order that a report might be sent out by the night mail which may reach any part of the state the following morning. Accordingly a large part of the diphtheria cultures received during the months of March, April and May, 1913, were examined at 5 o'clock, and again at 9 o'clock of the day they were received and at 8.30 the following morning. A microscopic examination was made of every culture at each of the three times whether there was a visible (to the naked eye) growth or not.

The results of these examinations are presented in the following tables:

RESULT OF EXAMINATIONS OF DIPHTHERIA CULTURES AFTER DIFFERENT PERIODS OF INCUBATION.

When examined (1913).	Number examinations.	5 p. m.			9 p. m.			8.30 a. m.			Per cent. of positives first found at 9 p. m.
		8 hrs. incub.			12 hrs. incub.			24 hrs. incub.			
		Pos.	Neg.	*	Pos.	Neg.	*	Pos.	Neg.	*	
March	44	3	5	36	5	9	30	11	26	7	18 %
April	548	20	62	466	64	149	335	229	304	15	19 %
May	262	21	28	213	42	68	152	143	103	16	14 %
Total	854	44	95	715	111	226	517	383	433	38	18 %

The last column gives the percentage of the total number of positives which were first discovered at the 9 o'clock p. m. examination. The temperature conditions as far as the growing of diphtheria cultures are concerned for the month of April are about the same as during the colder months since the temperature of the post-offices and mail cars is kept up by artificial heat.

It appears therefore that during the colder months, *i. e.*, from (October to June) 12 per cent. of the cultures that ultimately prove to be positive can be diagnosed correctly after an eight hour period of incubation and that 30 per cent. of the cultures that ultimately proved to be positive, can be diagnosed correctly after a twelve-hour period of incubation. This means that 18 per cent could be diagnosed as positive for the first time only after a twelve-hour period of incubation.

Conclusions

1. By making examination of diphtheria cultures at 9 o'clock p. m., reports on 18 per cent. of the specimens which eventually prove to be posi-

* No insufficient growth; suspicious forms; etc.

tive will be received by the attending physician, twelve to twenty-four hours earlier than when the examination is left until the following morning.

2. As a result of these examinations we have adopted the following scheme for the examination of all diphtheria cultures received at our laboratory in the morning during the colder months of the year:

A. Place all cultures in the incubator immediately on receipt.

B. Inspect all the cultures at 5 o'clock p. m. and make a microscopic examination of all that present a growth visible to the naked eye. Those which are positive may, of course, be reported upon immediately. Those which are not positive should be returned to the incubator.

C. Repeat the procedure as outlined under B—at 9 o'clock p. m.

D. Make microscopic examination of all cultures not reported on before early the following morning.

In conclusion, I desire to acknowledge the assistance of Mr. A. M. Alden and Mr. H. E. Harlow, rendered in the making of the examinations.

THE USE OF HYPOCHLORITE CAPSULES FOR THE TREATMENT OF SMALL QUANTITIES OF DRINKING WATER.

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Assistant Director Laboratory Division, Minnesota State Board of Health.

Read before the Laboratory Section, American Public Health Association, Colorado Springs, September, 1913.

The need of some practical and exact method for dispensing hypochlorites in the small quantities necessary to treat private or camp water supplies and for the use of travelers using water from questionable sources, has long been recognized. The method described in this paper has proven a very practical and efficient way of handling and preserving the small quantities of the chemical necessary for such purposes.

The method consists of diluting the hypochlorite salt with sodium carbonate, whenever necessary, to provide sufficient bulk to handle such minute quantities conveniently. This mixture is then placed in glass capsules which are hermetically sealed. The calcium salt of the hypochlorites is to be preferred for this purpose on account of its stability.

The details of preparation are as follows: The calcium hypochlorite is dried for one hour in a hot-air oven at a temperature of 50°C. after which it is cooled in a desiccator and its strength in available chlorine accurately determined. The sodium carbonate is also dried in a hot-air oven for one hour at 100°C. and placed in a desiccator until ready for use. The amount of calcium hypochlorite necessary to manufacture a given number of capsules is placed in a mortar and ground to a fine powder, and the proper quantity of sodium carbonate is added with constant stirring. The final mixing is brought about by sifting the resulting powder at least six times through a No. 50 sieve. This dilution with sodium carbonate is necessary only when the total weight of the calcium hypochlorite to be dispensed is less that 50 milligrams per capsule, as this amount of chemical is sufficient to provide a bulk convenient for handling. The tubing from which the capsules are made should be of soft glass, preferably amber-colored. The diameter of the tubing and the lengths into which it is cut are varied to accommodate the contents. The tube lengths, however, should be such that the total amount of chemical added will not occupy more than two-thirds of the length of the tube so as to allow for sealing. In the preparation of capsules which require dilution with sodium carbonate, *i.e.*, when the chemical content is less than 50 milligrams, it has been found most convenient to use glass tubing 3 millimetres in diameter, cut into 3.2 centimetre

lengths. One end of each tube is sealed in an oxyhydrogen flame before filling. The filling of the capsules is conveniently accomplished by means of a little glass or brass funnel and a small measure resembling the ordinary powder gauge used in loading cartridges. The latter is provided with a movable bottom which permits of an adjustment for filling different size capsules. The funnel should have a stem small enough to fit loosely into the mouths of the tubes. It has been found that with this method the variation in the chemical content of each capsule is very slight. After the contents are placed in the tube its open end should be sealed in an oxyhydrogen flame. Finally each capsule is scratched with a file half way between the ends to provide a point at which it will easily break when the contents are desired for use. These capsules should be stored and dispensed in amber-colored, wide-mouthed vials, to afford protection from light. For the convenience of the user, it is advisable to prepare them in sizes suitable for the treatment of water in the more common containers such as a glass, a pitcher, a pail or a barrel. In applying the chemical it should be evenly distributed throughout the water by a thorough mixing. The exact amount of hypochlorite necessary to successfully treat a water varies considerably and great care should be taken to add sufficient chemical to exterminate the common water-borne disease-producing bacteria. In most drinking waters that come under observation in this state, one part per million of available chlorine is sufficient to kill these organisms, yet some waters high in organic matter, either in solution or suspension, may require larger amounts.

Although the action of the hypochlorite is very rapid, it is recommended, when the larger receptacles are employed, to apply the chemical twenty minutes before the water is to be used.

It is not the intention of the writer to advocate the indiscriminate use of these capsules, but to recommend them to public health workers and others having some knowledge of the water to be treated and who are competent to advise as to their proper application.

REPORT OF THE COMMITTEE ON ORGANIZATION AND FUNCTIONS OF THE MUNICIPAL HEALTH DEPARTMENTS.

Read before the Section of Public Health Officials, American Public Health Association, Colorado Springs, September, 1913.

In the closing paragraph of the report of this committee submitted at the annual meeting of the Association, held in Washington, D. C., September, 1912, reference was made to the fact that the functions of municipal health departments could not be fully discussed without touching upon the relations between municipal, state and federal health authorities. While many of the public health problems require local solution, yet to command and hold the respect that public health measures must have in order to be effective, there should be a consistency of action by health officers throughout a country, which can only be secured through uniformity in the laws, which in turn should be based upon the highest knowledge in preventive medicine and sanitary science. Your committee has, therefore, decided that it can best serve its purpose for this meeting by presenting some suggestions along the foregoing outline, with the hope that if found practicable they may lead to a more complete report on the relation of municipal health departments to state and federal health authorities.

For the sake of brevity when the word municipal is used in this report, it is meant to apply to health departments having local jurisdiction only, such as in townships, boroughs, towns or cities. Likewise, the word state applies equally to state, province or district, as the case may be, for the problems of interdepartmental relations are much the same, whether maintained in Cuba, Mexico, Canada or in the United States. Again, by federal authorities, it is intended that the term shall apply to the general government of any of the countries.

The well-recognized functions of public health authorities are those activities concerned with:

1. Vital statistics.
2. Communicable diseases.
3. Care of waste and refuse.
4. Water supply, food, air, housing.
5. Child hygiene.

The underlying principles involved in regulating activities in all of these functions are of general application, and an analysis of the health laws of the various states and provinces and of countries abroad, with the view of arranging a program to show clearly how uniformity could be best secured

through a federal department of health, would no doubt hasten the date at which such department will be organized as a branch of the general government at Washington. For example, when we consider the present differences existing among states as to maritime quarantine regulations, making it possible for a vessel to land at one port and yet be prohibited from another, or subjected to tedious detention, or when we realize that in some ports both federal and state quarantine stations are maintained with differing jurisdiction and conflicting regulations, which may operate to the embarrassment of commerce, without affording additional protection to health, we may safely say that here is a field for improvement which could probably be best obtained by having all maritime quarantine stations under federal control.

Quarantine measures are also matters of international concern, and while many questions of great importance to public health have been adjusted in former years by special commissions and conventions, yet the increasing fleets of swift steamers, passing between international ports in less than the incubation period of some communicable diseases, ofttimes causes much trouble in ports of entry and give rise to perplexing situations, which could be best adjusted through federal departments which are in close touch with the municipal health departments. Again, the pollution of interstate and international streams will not be satisfactorily solved until federal departments are authorized and equipped to control such pollution.

The Constitution of the United States is framed to "promote the common welfare and to provide for the common defense," and while it would be mere conjecture to state that many of the activities which we deem vital in the present day were foreseen by the framers of that important document, and, though possibly they had in mind the invasion by a visible foe rather than the invisible hosts we are combating, when they provided for the common defense, yet the breadth and the reasonableness are there, and in that Constitution itself is the warrant for the establishment of a national department of health to conserve and to protect the public health, which should be of equal importance to war, or commerce or labor, or any other department, and in the last analysis if the health of a nation is not conserved, of what use are any of the others.

Vital Statistics.

In following the theme of this report, we know that federal governments in taking hold of the problems of the registration of vital statistics through the Bureaus of the Census, have, by the introduction of the international classification of the causes of death, already done much to eliminate the inconsistencies and inaccuracies of vital statistics, and stand forth as an example of what may be achieved in problems which are nation-wide in their extent. The support of the American Public Health Association to

this important work is testified to by its section on vital statistics, and it would be superfluous for this committee to say more than to urge the continuation of the support and encouragement of the Association toward that vigorous and useful section.

Communicable Diseases.

The improvements in transportation facilities during the last twenty-five years have so extended the radius of man's activities in his daily life, that the work of controlling communicable diseases has long since ceased to be only a local problem. It is frequently found in tracing the history of a person ill with a communicable disease, that he has been infected while at some remote place and may have traveled widely during the incubation period, and while in a state capable of transmitting infection may have been in contact with many persons. It is perhaps impracticable at the present time to secure national laws to regulate the control of communicable diseases. However, state laws are practicable and will provide for uniformity of action throughout a state; in fact, several states already have good laws on this subject, and this Association could, doubtless, do important service in promoting this needed uniformity.

The task of administration is by no means easy, and the ideal appears to your committee to be a strongly manned state department, acting ordinarily in an advisory capacity, yet with power for mandatory action in cases of need. This is particularly true in the case of typhoid fever, which is fast passing from an urban to a rural excess, due to the greater activities of cities to suppress this scourge, and where the cities must now adopt measures to prevent its introduction from rural sources. It is by no means an infrequent occurrence in the conduct of a municipal health department to find an infection from typhoid having occurred from an unreported rural case. In some places coöperation between municipal and state officers is doing much to reduce offenders in this direction, and this coöperative action can do much in the absence of close organization of the municipal departments and the health department of the higher units of the political divisions.

Care of Waste and Refuse.

Under this heading we have to deal with our old familiar—Nuisances—and the archaic laws which every health department has inherited from the days preceding the development of the germ theory as to cause of diseases.

The care of waste and refuse is largely a local matter but there should be state regulation to provide for uniformity of action and prevention of the disposal of such matter in any manner which would be detrimental to a person or property beyond the jurisdiction of the local authorities. Many

states have already enacted statutes under acts to control the pollution of streams which give a measure of control over trade wastes, and generally we are progressing so that in many places it will soon be necessary for any industry to retain its wastes, to render them innocuous and cease turning them into streams to the detriment of their neighbors and the destruction of the national resource of waterways.

Water Supply, Food, Air and Housing.

The supervision of these commodities and utilities should be based on broad lines laid down by federal authority, with delegated powers to states to govern local administrative officers, to the end that condemnation of movable commodities by a municipality would be condemnation in fact, as well as in name, and not result only in a mere shifting to another market, as may now occur in some cases.

The pollution of the air is most acute in the large centers of population, and general state laws, with local administrative authority, will probably be as far as we can hope to go, until public opinion will arise in stronger support of measures to prevent the pollution of the air or support the needed measures for better ventilation.

The housing problem is now largely a local matter and is developed in accordance with the enlightenment and progressiveness of communities. It is in large part a matter for state regulation, and as in several states commissions are at work endeavoring to codify our building laws and remove inconsistencies, which permit radical breaches of good building on opposite sides of dividing lines of political subdivisions, so will we in time secure uniformity in our requirements for good housing. Health officers may do much to create the right public opinion on these subjects.

Child Hygiene.

The appalling mortality in infants, especially in congested centers of population, also the evils of child labor, have attracted nation-wide attention with local interest in proportion to the progressiveness of states and cities throughout the world. The problem has both social and health aspects, and health officers should not fail to rise to the occasion and lend every aid and support in securing legislation uniform in principle for these activities which, though in the formative stage, are rapidly taking shape and will have far-reaching influence on the future. There is little divergence of opinion on what is desired. There is, as yet, great diversity in action. The problem is so large and its effects are such that national, state and local authorities must unite in order to secure the successful solution, and national guidance will do much in assisting to direct local efforts.

It is now well recognized that one of the most effective ways of promoting

public health is by educational methods. Many municipalities and states are doing excellent health educational work but we doubt not that great economic saving and greater efficiency could be secured if a central body, such as a federal health department, standardized health literature and arranged for its thorough distribution, and also provided expert service for advice, investigation, or any of the similar functions now ofttimes duplicated or in many cases wholly lacking.

Your committee realizes that in this brief report it has but outlined and touched upon the surface of questions which are vital to the progress of public health work. Each of the subjects treated is worthy of a painstaking and exhaustive investigation and report to point the way to uniformity of public health measures, and if they have succeeded in suggesting any thought that will further this Association, which has already done much in standardizing and stimulating the activities in public health work, the purpose of your committee has been served.

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HEALTH DEPARTMENT REPORTS AND NOTES.

REPORTS.

Edmonton, Alberta.

The situation in Edmonton is unusual. From a population of twenty-five hundred in 1901 it had increased to twenty-five thousand in 1911, and in 1913 the population was seventy thousand. The area of the city has increased even more rapidly until now it includes over twenty-seven thousand acres, or more than four-tenths of an acre per capita. It may readily be seen that with such a development many problems must arise which are difficult to solve but which must be handled promptly and thoroughly. The report of Medical Officer of Health Whitelaw for 1913 indicates that he has the situation well in hand although such questions as the disposal of refuse and the extension of water and sewer service over so large an area are still causing trouble.

Strictly speaking the report covers the period of fourteen months from October 31, 1912, to December 31, 1913 as the fiscal year has been changed to correspond to the calendar. Most of the reports, however, are planned to show the rates for the year as giving the figures for the entire fourteen months. The death-rate for 1913 was 10.73; the birth-rate, 23.0; and the infant mortality rate, 171.11; the latter figure probably being high as a result of incomplete reporting of births but accurate death reports, and on account of the large foreign element and overcrowding of houses with the accompanying unsanitary conditions. The communicable disease rate is high, as might be expected on account of the rapid immigration with the resulting importation of disease and difficulty of getting early reports of cases. Measles was especially active and shows a record of 975 cases and 29 deaths, both figures being the highest among all communicable diseases. Smallpox is fairly well controlled by compulsory vaccination of school children and of persons exposed to any case which may be imported.

The difficult task of street cleaning and scavenging has been turned over to a new city department, much to the relief of the health department. Dairy and milk inspection has been placed in the hands of two new men, apparently as a result of the incompetency of those formerly holding the position and the 1913 report indicates that they have been carrying on active and valuable work which has resulted in considerable improvement. The treatment of vital statistics also deserves favorable notice.

Recommendations for future improvement include the appointment of a visiting nurse, the establishment of additional public comfort stations, the improvement of housing conditions and the institution of work in popular education on public health matters.

The report is in general well prepared and is very interesting. A few additions, such as a financial statement, a list of the staff of the health department, etc., would be an improvement.

Cincinnati, Ohio.

Dr. J. H. Landis, Health Officer of the City of Cincinnati, Ohio, presents the report of the department of health for the year 1913. During the latter part of June and first of July the health department was placed in a rather extraordinary position due to a strike among the employees of various ice companies. The city council authorized the health department to buy ice to sell to the people. But the situation became so acute by July 2, that the health officer was authorized to seize and operate the ice plants in order to allay the widespread suffering on account of the ice famine. Following this the ice plants were seized and operated for a period of four days, when the differences between

the companies and employees were finally settled. During the time the strike lasted, over twenty-three thousand dollars was received for the sale of ice. The total cost to the city after settling all claims was $757.20. The handling of an ice famine by the health department, due to a strike, is a unique problem but was overcome in a very efficient manner by the Cincinnati officials.

Continuing in his introductory report, Dr. Landis gives a summary of the year's work and outlines the needs of the department. The following summary of statistics illustrate in a way the efficiency of the health work; the general death-rate for 1913 was 16.89 per 1,000 population, which is an average figure. Of particular interest is the very low typhoid death-rate—6 per 100,000 for 1913. This places Cincinnati fourth in a list of fifty of the largest cities in the country. The death-rate of 5 per 100,000 for scarlet fever is also very low. It is noted that measles has a rate of 16.8 and whooping cough of 12.5 per 100,000, both being much higher than the rate for either typhoid or scarlet fever.

The reports of the various divisions of the department are very well presented, several of them containing photographs and all have statistical tables. One of the most important divisions is that of Medical Inspection and Relief. Aside from the usual work of surveillance of infectious diseases, school medical inspection, etc., several physical examinations of registered prostitutes was carried out at different times in order to determine the prevalence of venereal disease. All diseased persons are quarantined in the hospital. Reports from three specialists are to the effect that, since the work of locating and quarantining cases in the hospital was begun by this department, fewer advanced cases are treated in the hospitals and clinics and fewer new cases are applying for treatment in their private practice.

What is especially creditable in the work of the health department and more noticeable in this division, is the hearty coöperation with various private and charitable organizations. Much practical work has been carried out with pretuberculous children in the open air schools. The improvement in the health of these children was marked.

Under the laboratory division are shown photographs of two very fine new laboratories, one for bacteriology and the other for chemistry. During the year 1913 a total of 15,266 samples of various kinds were examined. Of this number, 8,245 chemical and 1,811 bacteriological examinations of milk were made. In the diagnostic work, 1,769 tuberculosis sputum samples and 2,148 diphtheria cultures were examined. It is evident from the scope of the work shown, that new working quarters were necessary.

The financial statement shows that $126,010 was expended on health work. This was divided as follows:—general administration, $11,930; sanitary inspection, $14,264; medical inspection, $43,466; food inspection, $21,831; laboratory, $4,281; tuberculosis dispensary, $2,427; vital statistics, $1,740; bond ordinance, etc. (which includes ice strike and ice plant emergency), $26,068.

Taking this report as a whole, it may be classed as one of the most progressive which comes to our notice.

Corning, New York.

The annual report of the health officer of Corning for the year 1913 consists of about two columns in the evening paper. Corning appears to be far in advance of many cities of its size, as far as public health work is concerned, and is fortunate in having as progressive a health officer as Mr. Swain.

The health officer is assisted in his work by a visiting nurse and by a sanitary and plumbing inspector, both of whom are given credit for conscientious and effective work. It is interesting to note that the recommendations for improvement include the employment of another nurse whose duty will be the following up of the conditions demonstrated by the inspections of the school physicians. A county hospital for the care of tuberculosis and a local isolation hospital for other contagious diseases are also needed. The city water supply is reported as dangerous and in need of improvement although the high typhoid rate is attributed to the use of wells known to be contaminated.

No report of infant welfare work, dairy inspection or finances is given.

Toledo, Ohio.

The Board of Health of Toledo, Ohio, present their report for the year 1913. The first thing noticed on taking up the report is the short summary of vital statistics printed on the outside front cover. This is a good idea, for in many reports one has to search some time before finding out the population and the death- and birth-rate.

In the report of the health officer, Dr. Becker, is given a general statement of conditions and needs of the department. The amount of $49,260 is asked for to carry on the work for the ensuing year, but there appears to be no financial statement to back up this budget. Such a statement is really one of the most important items of a health report.

Apparently Toledo is rather conservative as regards spending money for health. Dr. Becker calls attention to the need of a full-time medical inspector and bacteriologist and also of a full-time chemist. For a city of 180,000 population these two officers are very necessary.

The typhoid fever death-rate in Toledo is quite high being 41.5 per 100,000. Dr. Becker gives as the main reason for such a high rate the fact that there are a large number of surface wells which are still in use.

During 1913, there were 249 cases of diphtheria with forty deaths giving a rate of 22.2 per 100,000, and a fatality of 15.56 per cent. This, too, is a rather poor showing and mainly because the doctors of Toledo have not all been educated to the early use of antitoxin. However improvement is being made along this line.

The section on vital statistics has some very interesting comparative and mortuary tables.

Although there is apparently no work along the line of infant welfare, the report of the registrar of vital statistics contains a very interesting spot map, showing by spots each infant death during 1913. This is a good object lesson to use in an appeal for organized work for infant welfare under the department. It is to be hoped that next year's report will show that Toledo has awakened to some of the big public health problems that her health department is striving with.

DEPARTMENT NOTES.

County Health Associations in Michigan.

In many, perhaps most, localities there is not a sufficiently general knowledge or appreciation of the value of public health work to occasion a demand for a county health officer. Where the movement for county health officers is being undertaken, the following plan from an article in the June number of *Public Health*, the monthly bulletin of the Michigan State Board of Health, may prove a valuable educational preliminary.

"The movement to organize county good health associations is rapidly progressing. Starting with Jackson county, quickly followed by Hillsdale county, the latter making the organization a permanent one, and now comes Barry county which is making arrangements for a good health week. Other counties are perfecting arrangements for a county good health organization patterned after the Hillsdale county movement. This is encouraging evidence of the rapidly growing spirit of sanitation among the people. We earnestly plead for a county organization in every county. Where conditions prove that a county organization cannot be developed, why not organize city, village and township good health movements? Such organizations could do a great good, indeed much good has already been done.

"Good health being the essential part of education, why could not the good health movement be incorporated with teachers' associations, where health associations are not separately organized?

"Hillsdale and Barry counties good health movements include commissioner of schools, teachers, grangers, all health officers in the county, women's clubs, officers of municipalities, in fact, everybody who lives and wants everybody else to live. The motto

of the good health county movement is, 'Education is to know for the sake of living.'"

Practical Tenement House Department Work.

"The death-rate in New York City is now the lowest that it has ever been. Several causes have tended to bring about this desirable condition. Among these causes there can be no question that the careful and systematic attention now being given to sanitary conditions by the various city departments charged with the supervision of such conditions should occupy the most prominent place. In this connection the tenement house department has recently instituted a new procedure which is of interest. The department obtains from the board of health a record of all deaths and cases of contagious or infectious diseases occurring in tenement houses.

"While it cannot be maintained that all forms of contagious diseases are directly chargeable to bad plumbing or to the sanitary conditions, and while it can rarely be proved that in any particular case the contagious or infectious disease arises from the condition of the house, it is a well known fact that there is a distinct relation between such conditions and contagious and infectious diseases in general.

"The department, therefore, is giving special attention to houses in which it appears from the board of health records that there have been an unusual number of deaths or cases of contagious or infectious diseases.

"Whenever the health records show that three or more deaths or cases of recorded diseases have occurred in a tenement house during the month, or that five or more such cases have occurred during the two previous months, a special inspection of the tenement house is ordered forthwith so as to ascertain whether there are any plumbing or sanitary defects existing at the premises. If any such defects are found, orders are immediately issued, together with a special communication to the owner calling his attention to the health record and to the defects.

"In most instances the owners have shown a greater spirit of coöperation and compliance than had been expected by the department, and it is believed that this procedure will accomplish much in obtaining prompt compliance with the department's orders in such cases."

National Municipal Review, July, 1914.

Report of Tuberculosis Commission in Kentucky.

"Kentucky, by an act of the legislature, established a commission in 1912 for the study of tuberculosis. The first report of that commission, a cloth-bound pamphlet of sixty pages, sets forth what has been accomplished. The work so far has been chiefly preliminary and educational. An exhibition car and moving-picture exhibit, teachers' institutes, a nursing service and the distribution of much printed matter have been some of the means employed. Special county campaigns in coöperation with local organizations have also been conducted. The further work of the commission will consist not only in keeping up the educational campaign, but also in the establishment of local sanatoriums in the districts into which the state is to be divided. The report shows that much interest has been aroused and much good work done."

Jour. of the A. M. A., June 13.

Work of a Large Modern Health Department.

The leading article of the June 27 issue of the weekly *Bulletin* of the Department of Health of New York City is entitled "Watching the Health Department at Work" and consists of a resumé of a single week's activities in the nine bureaus of the department. It is introduced as follows:

"Not so many years ago it was believed that the proper functions of a health department were limited to the registration and tabulation of certain vital statistics, to the abolition of nuisances, the inspection of premises in order to discover damp cellars, leaking cesspools, foul drains, etc., and to matter relating to the spread of the more readily communicable diseases, such as

smallpox, diphtheria and scarlet fever. In accordance with this conception, the Department of Health of this City was organized into two bureaus, the Bureau of Records, and the Sanitary Bureau. Contrast all this with the modern conception of the duties of health authorities: Diagnostic laboratory work, production and distribution of antitoxic sera and vaccines, performance of intubation, home supervision of tuberculosis, hospital and sanitorium treatment of tuberculosis, school medical inspection, intensive work in infant hygiene, supervision of midwives, control of the milk supply, bacteriological research, and organized public health education!"

Child Welfare Work in Canada.

The May issue of the *Regina Health Bulletin* announces that, in order to prevent the increased infant mortality of the summer months, the health department will undertake systematic child welfare work. For this purpose, a special nurse has been engaged to furnish advice and assistance to anyone desiring her services. In addition a babies' milk depot has been opened where babies may be brought for examination and where mothers may be advised as to the care of the child, proper feeding, etc. A weekly clinic has also been arranged.

Public Health Administration.

Health and Hygiene, the bulletin of the Louisville Department of Health, contains the following brief extracts from a recent paper by Assistant Surgeon-General W. C. Rucker.

"At a recent health meeting in Chicago, Assistant Surgeon-General W. C. Rucker, United States Public Health Service, read a most excellent and thorough paper on the subject of 'Public Health Administration.' The following are extracts from his paper:

'Three things are necessary to efficient public health administration,—the man, the power and the starting point.

'The knowing what you want to do, in public health work, is practical epidemiology, a knowledge of which is possessed by a relatively small number. The power with which to do it is legal and financial. Both are necessary.

'Eternal vigilance is the price of freedom from disease. The epidemiologist must, therefore, devote all of his time to his official duties.

'Public health officials must be full-time officers. They must be adequately salaried.

'Public health is a rather expensive necessity, and if the general public wants it, it will find that it cannot get it from poorly prepared, underpaid men.

'The corner stone of efficient public health administration is the well-qualified, full-time, well-paid health officer.

'Granted an efficient public health administrator, he is powerless without legal backing. This legal backing is sanitary law.

'Idle laws are worse than no laws at all. One of the most useful things which could be done in furthering the cause of public health would be a revision of the sanitary laws, and the repeal of laws which are impractical of administration, or which, if administered, would defeat the purpose for which they were enacted.

'We have been marvelously illogical with regard to our vital statistics.

'We have collected data upon births, marriages and deaths, none of which conditions is particularly dangerous to the public health, and have almost entirely lost sight of the sick man who is the point from which most human diseases are disseminated.

'It is the living carrier of disease which is dangerous.

'Above all, a spirit of coöperation is essential. This coöperation begins with the practicing physician

'Every practicing physician of intelligence realizes that if he fails to do his duty in this regard, he not only endangers the health of his patients, and their families, but also of the community at large.

'When physicians fail to report cases of communicable disease, it is either the result of ignorance, carelessness, or a desire to protect the interests of their patients. They would not be imbued with the latter desire if the general public were in thorough accord with the spirit of preventive medicine.

'It seems to the practical health administrator as though the most important single thing which should be taught in the campaign of public health education which is now going on would be the necessity for making prompt and accurate morbidity reports.

'Public health can be bought at a price. Compared with the returns it brings, the price is not high.

'It is necessary that the public health administrator demonstrate in terms of dollars and cents that public health and public wealth are inseparable, and they are practically synonymous terms.

'The value of coöperative effort cannot be overestimated. Among people who do not earnestly desire health, it is well nigh impossible, without the use of force, to bring about sanitary reforms.

'Three things are necessary to efficient public health administration: the man—the well trained, well remunerated, full time, health officer; the power—the intelligent, uniform, accurate law, and the adequate appropriation; the knowledge of the location and prevalence of disease, in order that it may be controlled by the coöperative effort of the general public, the medical profession, and the public health administrator.'"

Security of Tenure of Health Officers.

Mr. Lloyd-George, Chancellor of the Exchequer, has received a deputation of the British Medical Association, the Society of Medical Officers of Health, the National Housing and Town-Planning Council, the Mansion House Council, the Rural Housing and the Sanitation Council, and the Royal Institute of Public Health on the subject of the security and tenure, and the superannuation of health officers. Among the points argued were that the health officers were practically under the direction of persons whose defects they very often had to point out, that superannuation should be given at the age limit, that they were liable to dismissal at three months' notice, that in one instance a health officer had been asked by his council to rewrite a portion of his report, and that it was impossible for health officers to be as fearless in the interests of the public good as they should be. Replying, Mr. Lloyd-George said that the speeches represented a case that only had to be stated to carry conviction to fair and impartial minds. The powers entrusted to local authorities even at the present moment were enormous. He should like to see some of these powers considerably strengthened, but he was convinced that until greater independence was insured for the officers who would administer those provisions, it was idle for Parliament to waste time in carrying more acts. Security of tenure to health officers and inspectors must be an essential part, if not an essential preliminary to any further legislation dealing with the housing question. He had had letters from health officers saying that they dared not report the true facts, and that the reports sent to the Local Government Board did not represent a tenth of the facts in their areas. Therefore he was whole-heartedly in sympathy with the demand, and the government had felt that there ought to be specific grants for a substantial part of the salaries of the officers concerned, and that they should be in a position to demand from the local authorities greater security of tenure.

London Letter in the *Journal of the A. M. A.*, July 11.

Hand Laundries.

"The Sanitary Division is very busy this month going through all hand laundries (mostly Chinese) in the city, as all applicants for renewal of license must obtain from the health officer a certificate that the premises are suitable and satisfactory for the purpose. After application for renewal is made, an inspector visits the premises and notes all defects. Duplicate specifications are then made out of all work required to be done in order to make the premises comply with the Laundry Regulations, and a copy served on the applicant.

"As these laundries have in previous years been required to install impervious laundry tubs, concrete floors in washrooms, adequate plumbing, ventilators, etc., the present specifications relate mostly to the thorough cleansing and renovating of such premises, includ-

ing walls, ceilings, woodwork, etc., together with the repair of any dilapidations, defective or foul water-closets, etc. This year we are also measuring up all the sleeping rooms, and carding each room with the exact number of men allowed to occupy same. This is necessary on account of the number of prosecutions we were obliged to make last year for over-crowding of such rooms.

"Several inspections are frequently necessary before permit can be issued, and by the time we get through issuing permits the laundries will be in a much better and cleaner condition than ever before.

"There are 145 such hand-laundries in the city.

"The new regulations of Council render it very difficult for any new laundries to be started up."

Winnipeg Health Bulletin, June.

Pasteurizing New York's Milk Supply.

Without a doubt, the control of the milk supply of the city of New York is one of the hardest tasks the health department has to deal with. The weekly *Bulletin* of the Department for June 6, 1914, reports that about 99 per cent. of the supply is pasteurized, which is an exceedingly creditable showing.

"The situation regarding the compulsory pasteurization of all except the highest grade of milk sold in this city is extremely satisfactory, at the present time about 99 per cent. of the city's supply being effectively pasteurized. This represents an enormous improvement over conditions a year ago, and should make milk-borne disease a rarity in this city.

"The change has been accomplished with a surprisingly small number of arrests and prosecutions. Where the department encountered undue delay on the part of milk dealers in complying with the pasteurization regulations, civil suits were brought to recover judgment. This mode of procedure proved highly efficacious. It undoubtedly has many advantages in certain circumstances over the criminal proceedings brought by other cities in the United States for the same purpose. If the facts are proved in a civil suit, there is no such thing as a suspended sentence.

"The pasteurizing plants are subject to close supervision by the Department of Health, and large numbers of samples of milk are being examined bacteriologically to check up the efficiency of their operation.

"The Department has had the cordial cooperation of all the large milk dealers and of nearly all the smaller ones, and there is every reason to believe that at the present time the milk supply of this city is of better quality than that of any other large city in the world.

Saloon Sanitation.

In a large number of places the saloon is an evil which is difficult to overcome. But if it must be with us, the sanitary conditions, at least, ought to be made as good as possible. In their weekly bulletin, the Board of Health of Cincinnati, Ohio, report the work which they are doing on this subject. It would be well for other cities to look into this matter also.

"In the fall of 1913, following a vote by the people, the number of saloons in the city was reduced to 802. All saloons thereafter were licensed, regulated and inspected by the state.

"To secure cleanliness, adequate fixtures, sanitary methods and practices tending toward prevention of disease is the object of the systematic inspection inaugurated in February by the local health department.

"Common towels, unclean glasses, defective plumbing and drainage, filthy or obstructed toilets, common forks, dirty free lunch dishes, expectoration on the floor, etc., unquestionably subject the patrons to the liability of contracting various contagious diseases.

"Men of all types—well, sick, rich and poor—frequent saloons. What better way is there of contracting and transmitting skin and venereal diseases than by using one of the 724 common roller towels that were hanging at the bars, toilets, lunch counters, and wash stands of 431 saloons? As a location for a common towel, can you imagine a worse place than the lavatory in a public saloon? Common towels are now prohibited. The more progressive proprietors are installing individual towels.

"In 151 saloons the inspectors found the glasses dirty. Tuberculosis, diphtheria and other bacterial germs of the throat and mouth have been found on the common drinking cup. Because you pay for the drink, the law permits the common glass to remain, but paying does not prevent you from picking up the germs left on the dirty beer glass by a preceding user. Unclean glasses were found in some of the best saloons in the city.

"The common fork glass located at the free lunch counter was originally placed there with good intentions by the proprietor, but the slovenly habit of eating with the forks has placed it under the ban of the department. A basket of clean individual forks, to be kept filled by the porter, is the substitute recommended. Forks are provided to remove the food from the plate to the hand and must not be used to put food into the mouth.

"One hundred and thirty-seven saloons had filthy cuspidors or bar drains, while the sixty-eight which provided no cuspidors resulted in frequent spitting on the floor—a filthy and dangerous habit.

"On the first inspection 773 saloons were visited; 75 were rated as bad, 296 as fair, 381 as good, while only 21 met every requirement and were rated very good."

Health Activities in Panama.

Panama is so far away that we do not often stop to realize what is going on down there. According to the June 17, 1914, issue of the *Canal Record* several important measures are being carried on at present. A uniform type of metal garbage can with self-closing cover has been adopted and it has been made mandatory that property owners provide their premises with these cans at their own expense. The adoption of these cans has done away with a large amount of the nuisance due to the former old-fashioned methods.

An active milk inspection is being carried on, and the health office is now preparing to make a tuberculin test of dairy cows and meat cattle.

The Panama health officer has also established a score card system in connection with the inspection of bakeries, hotels, restaurants, and other places where food is manufactured or served. Fifty is the minimum score permissible and the owners who fall below this are subject to a fine, or the closing of their quarters. The score is given below. It would seem as if a little too much value had been placed on cleanliness of tables and furnishings, but not enough on attendants' personal cleanliness.

	Perfect score.
Room free from contaminating surroundings	4
Tight, smooth floors	2
Tight, smooth walls and ceiling	2
Light (sunlight, 4; electric light, 2; gaslight, 1)	4
Ventilation	2
Large, convenient sinks	4
Convenient furnishings and machinery	2
Cleanliness of floors	6
Cleanliness of walls	4
Cleanliness of ceiling	2
Cleanliness of tables and furnishings	10
Cleanliness of sinks, 4; shelves, 2	6
Utensils-mixers	4
Utensils-pans, 2, knives and cutters, 2	4
Clean cloths for rolling jelly rolls, etc	2
Freedom from flies, cockroaches, and other insects	12
Attendants' aprons and overalls	4
Attendants' personal cleanliness	4
Storage for materials—flour	2
Storage for materials—milk, eggs, etc	2
Washroom and lockers	2
Water closet	2
Patio, yard, or alleys	2
Disposal of refuse	4
Storage of baked goods	4
Transportation—wagon	2
Transportation—drivers and methods	2
Total	100

Proposed Change in New York's Street Cleaning.

Commissioner John T. Fetherston of the Department of Street Cleaning, New York City, has recently proposed a plan for reorganization of the system of street cleaning and refuse disposal for the city and has asked that a model district be established to test the value of the plan. It is estimated that for one district the improvements will cost $253,000, but will bring about a yearly saving of $54,432 compared with the present cost. The *Engineering Record* of June 27 gives the general outline of the plan briefly as follows:

"The main feature of the proposed plan is the replacement of horses with motor-tractors, each fitted with three types of trailers, one for street flushing or sweeping, one for refuse disposal, and the third for plowing, sweeping and hauling snow. The tractor-trailer system, obviously, is one of great flexibility, for no single motor will be limited to a single kind of work and working hours will not be confined to a single shift. By extending the functions of the equipment and increasing the hours of work for the tractors fixed charges will be decreased and lower costs will be secured than is possible with horse-drawn equipment. This is not guesswork. A careful analysis of the situation was made and the conclusion is based upon first costs and costs of operation, taking into account the extra hours of work for the tractors as compared with horses.

* * * * *

"For collecting refuse, a trailer body fitted with removable compartments to hold at least ten cubic yards of refuse will be provided and so designed that material from the standard cans will be transferred to an appropriate compartment without creating dust or nuisance. All classes of refuse will be collected at one time and not more than one collection trip per day will be made through any street. This will result in all cans being removed from sidewalks and areas except at the removal period, which can be closely timed for every street.

"The report goes farther than the cleaning of streets. It makes provision for the collection and disposal of refuse. Under the new system the separation of household refuse into three classes will be continued and each building—in the model district at least—will be furnished with a set of cans. The garbage can will have an attached cover and will be painted a distinctive color to distinguish it from the ash can. Rubbish will be tied in bundles as required by existing ordinances. The distinguishing feature of the proposed method of handling the garbage, therefore, is the closed system which will obviate present nuisances from odors, flies, dust and loose paper. In place of open dumps at the waterfront a closed transfer station with an electrically operated telpher system for unloading the refuse containers from vehicles to scows is recommended."

Public Health Organization in India.

The Medical Officer (London) contains in its issue of July 4 a brief review of a recent report of the Government of India on recent reforms in connection with sanitary administration in that country. It is pointed out that sanitary progress is necessarily slow on account of the primitive nature of the people, their ignorance, superstitions, and social customs, and the slight friction which naturally exists between the two races. We clip the portion of the article which tells of the form of administration:

"Since 1912 the Sanitary Commissioner, whose office had been created as a result of the Plague Commission's report to Lord Curzon's Government, has been the independent adviser to the Government of India in all technical and sanitary matters, but all questions of personnel, as well as the administration of the bacteriological department and research generally, have been placed under the control of the Director General, Indian Medical Service, with the Sanitary Commissioner as his staff officer. The superior or central sanitary organization in India now includes a Sanitary Commissioner with the Government of India; a bacteriological department which has five centres, each having one director and various assistants; and fifteen new appointments have recently been sanctioned for the prosecution of research work and directing investigation in the field. The eleven local governments have each appointed a sanitary commissioner, and all but the government of the sanitary province of Delhi have appointed deputy sanitary commissioners. In nearly every province health officers and sanitary engineers have also been appointed. The policy of the Government of India is to keep the control of research under itself, but to decentralise other branches of sanitation. It is considered that while the whole general direction of a policy of public

health should remain with the central government, all detailed control and executive action must be left to the local governments. The sanitary commissioner with the Government of India is a touring officer empowered to consult and confer informally with local governments and their officers upon matters connected with sanitation. He is not permitted to encroach upon the authority of local governments over the officers under their control. In every province sanitary boards have been established with varying powers, some being merely advisory, others having authority to sanction schemes and allot funds. These boards are composed of officers belonging to the medical, sanitary, engineering and other branches of the civil services with the addition of non-officials.

"Some difficulty has arisen in providing means for the training of the superior sanitary staff. A British diploma in public health is required from candidates for the posts of deputy sanitary commissioner and health officer of the first class, and training classes for sanitary inspectors are now held in all the important provinces. The posts of deputy sanitary commissioner and health officer are now open to Indians. Nine deputy sanitary commissioners out of 26, and the majority of health officers, are Indians. The new bacteriological department, in which 28 officers are employed, is also open to duly qualified Indians."

State Control of Local Health Authorities.

"Home Rule and Health" was the subject of a statement given out not long ago by Dr. E. F. McCampbell, secretary of the Ohio state board of health, Columbus. It was prompted by opposition in the Ohio legislature to a bill giving the board authority to remove an incompetent local health officer and by opposition to another bill providing for state supervision of tuberculosis hospitals. Dr. McCampbell said in part:

"Centralized control is needed in matters pertaining to the public health. Home rule would be dangerous. Disease does not respect political boundary lines. The water supply of one town is frequently polluted by the carelessness of another town in permitting refuse and sewage to enter water courses. The occurrence of infectious diseases in municipalities is quite frequently due to the fact that they have been imported from the country districts or from other municipalities.

"The administration of public health work should be kept distinctly out of politics and efficient and trained men should be in charge of the work. As a matter of fact, much more would be accomplished if the state would take the major portion of the authority away from the local communities and by so doing it would be possible to place an expert sanitarian in charge of each municipality or district."

National Municipal Review, July, 1914.

A Novel Milk Contest.

A Milk Contest was recently held in Portland, Oregon, under the direction of the Bureau of Animal Industry, United States Government, and the Bureau of Health. Mr. F. H. Bothell, Assistant United States Dairy Investigation, conducted the contest, assisted by Prof. R. R. Graves, professor of dairying, Oregon Agricultural College, and Dr. H. B. Marcellus, the health officer.

This was a preliminary contest of a series of four to be held during the year. The product of all dairies and city milk plants will be rated upon the results of these contests and the samples analyzed by the health department.

In the contest, 156 samples or 312 bottles of milk were collected from 92 dairies, 16 pasteurizing plants and 14 city milk depots. Very few of the samples showed any appreciable amount of visible dirt. The average butter fat was 4.0.

The product of 92 dairies supplying most of the raw dairy milk in the market scored as follows:

Over 90	9.8%
Over 80	63.2%
Over 70	79.3%
Over 60	85.0%

The product of 16 pasteurizing plants scored as follows:

Over 80 ..... 18.8%
Over 70 ..... 50.0%
Over 60 ..... 62.5%

The product of 14 milk plants scored as follows:

Over 80 ..... 7.2%
Over 70 ..... 64.2%
Over 60 ..... 81.4%

In spite of the fact that the contest was held on three of the warmest days, there were only a few of the samples showing a high bacterial count. For instance, 23 per cent of the samples of raw dairy milk contained less than 10,000 bacteria per cubic centimeter —which is considered excellent. 37 per cent were under 20,000, 58 per cent under 50,000, 71 per cent under 100,000, and 83 per cent under 200,000, the maximum count allowed by the Ordinance.

During the contest all marks of identification were erased from the bottles, so that the judges did not know whose milk they were passing upon.

The dairymen knew nothing of the contest beforehand and samples were collected from the wagons—two bottles being taken in each case.

The results of this system will amount to this—when a man begins to market his milk in this city, he enters into competition with other expert dairymen. The laws of supply and demand will regulate the price according to the quality of the goods. Poor milk will command a low price.

It is anticipated that the dairymen will enter very keenly into this competition. The plan is to give suitable diplomas or prizes for the winners in each class at the end of the year.

PUBLIC HEALTH NOTES.

The Use of Borax to Prevent Flies from Breeding.

The Department of Agriculture reports that a small amount of ordinary borax, sprinkled daily on manure, will effectively prevent the breeding of the typhoid or house fly. Similarly, the same substance applied to garbage, refuse, open toilets, damp floors and crevices in stables, cellars or markets, will prevent fly eggs from hatching. Borax will not kill the adult fly nor prevent it from laying eggs, but its thorough use will prevent any further breeding.

The investigation, which included experiments with many substances, was undertaken to discover some means of preventing the breeding of flies in horse manure without lessening the value of this manure as a fertilizer for use by the farmer. It was felt that if some means of preventing the breeding of flies near a human habitation could be devised, the diseases spread by these filthy germ carriers could be greatly reduced. While the "Swat the fly campaign," traps and other devices for reducing the number of typhoid-carrying flies are of value, they are of less importance than the prevention of the breeding. It was realized, however, that no measure for preventing the breeding of flies would come into common use unless it was such that the farmer could use it on his manure pile without destroying its usefulness for growing plants, and without introducing into the soil any substance that would interfere with his crops.

As a result of experiments carried on at the Arlington Farm, in Virginia, and New Orleans, La., the investigators found that 0.62 of a pound of borax, or 0.75 of a pound of calcined colemanite (crude calcium borate) would kill the maggots and prevent practically all of the flies ordinarily breeding in eight bushels of horse manure from developing. This was proved by placing manure in cages and comparing the results from piles treated with borax and from untreated piles. The borax, it was found, killed the fly eggs and maggots in the manure and prevented their growth into flies.

In the case of garbage cans or refuse piles, two ounces of borax or calcined colemanite, costing from five cents a pound upward according to the quantity which is purchased, will effectually prevent flies from breeding.

While it can be safely stated that no injurious action has followed the application of manure treated with borax at the rate of .62 pound for eight bushels or even larger amounts in the case of some plants, nevertheless borax-treated manure has not been studied in connection with the growth of all crops, nor has its cumulative effect been determined. It is therefore recommended that not more than fifteen tons of the borax-treated manure should be applied per acre to the field. As truck growers use considerably more than this amount, it is suggested that all cars containing borax-treated manure be so marked, and that public health officials stipulate in their directions for this treatment that *not over .62 (62/100) of a pound of borax for eight bushels of manure be used*, as it has been shown that larger amounts of borax will injure most plants. It is also recommended that all public health officials and others in recommending borax treatment for killing fly eggs and maggots in manure warn the public against the injurious effects of large amounts of borax on the growth of plants. Purchasers of manure produced in cities during the fly-breeding season should insist that the dealers from whom they purchase give them a certified statement as to whether or not the manure in the particular car or lot involved in the purchase has been treated with borax.

In feeding to hogs garbage that contains borax, care is also recommended, especially when the animals are being fattened for market. Borax is not a very poisonous substance and the feeding of garbage that contains it to hogs, is not likely to be a serious matter. On the other hand borax in large quantities does produce gastric dis-

turbances and for this reason a certain amount of care is advisable.

The method for using this substance in the case of stables is to sprinkle the borax or colemanite in the quantities given above, by means of a flour sifter or other fine sieve, around the outer edges of the pile of horse manure. The manure should then be sprinkled immediately with two or three gallons of water to eight bushels of manure. It is essential, however, to sprinkle a little of the borax on the manure as it is added daily to the pile, instead of waiting until a full pile is obtained, because this will prevent the eggs which the flies lay on fresh manure from hatching. As the fly maggots congregate at the outer edge of the manure pile, most of the borax should be sprinkled there.

Borax costs five to six cents per pound in 100-pound lots in Washington, and it is estimated that at this rate it would cost only one cent per horse per day to prevent all breeding of flies in city stables. If calcined colemanite is purchased in large shipments, this cost should be considerably less. At the same time, if the borax is used on the manure only in the proportions stated, its value for use in the garden or for sale to farmers will not be lessened.

It is believed that this information will greatly help the health authorities in their campaign against the fly. The health authorities have long tried to prevent the breeding of flies in city stables through the use of iron sulphate as a larvacide. In the case of iron sulphate, however, a large amount is required, and other insecticides such as Paris green or potassium cyanide, while effective in killing the flies, are very expensive or extremely poisonous. Borax, which is used freely in most households, and is readily available in all parts of the country, has the advantage of being comparatively nonpoisonous and non-inflammable, readily soluble in water and easy to handle. It can be purchased at retail for ten cents a pound, and a single pound used as directed in a garbage pail or open toilet may prevent the breeding of hundreds of dangerous flies.

The details of the experiments with borax and other larvacides will be found in U. S. Department of Agriculture Bulletin No. 118.

Our Foreign-Born Population as a Factor In the Tuberculosis Problem.

"In an interesting paper presented at the annual meeting of the American Sanatorium Association last week, Dr. Walter Rathbun, Physician in Charge of the Otisville Sanatorium, called attention to the fact that out of 1,197,892 immigrant aliens admitted to this country at Ellis Island during the year ending January 30, 1913, only 38 were debarred on account of having tuberculosis. That this small number represents but a small fraction of immigrants actually tuberculous will hardly be doubted by any one familiar with the social aspect of this disease. Nor is the failure to recognize a larger number of infected individuals at all surprising in view of the very great number of immigrants to be examined and the wholly inadequate staff of examining physicians.

"The following sanatorium and hospital figures giving the proportion of alien patients in typical institutions may be of interest.

Bedford Hills Sanatorium, 84 per cent. foreign-born patients, most of them aliens.

Metropolitan Hospital, 51 per cent. foreign-born patients, 15 per cent. of them aliens.

Bellevue Hospital, 48 per cent. foreign-born patients, 25 per cent. of them aliens.

Riverside Hospital, 45 per cent. foreign-born patients.

Otisville Sanatorium, 42 per cent. foreign-born patients.

Seton Hospital, 39 per cent. foreign-born patients.

"The population of New York City includes 40 per cent. of foreign-born people. The proportion of foreign-born patients in the institutions mentioned above is considerably more than it should be. According to Dr. Rathbun, a stricter examination should be made of all immigrants on arriving, and in every instance the chest of these individuals should be examined by physicians skilled in the diagnosis of pulmonary tuberculosis. Dr. Rathbun suggests that the Federal Government appoint a commission of experts to study the situation and to outline a more thorough system of examination."

Bulletin of the New York City Department of Health, June 6, 1914.

Cleaning up and Staying Clean.

The Sanitary and Sociological Bulletin of the Colorado Fuel and Iron Company reprints in its April issue the following:

"The Pueblo Commerce Club has just issued the following ten commandments for a clean city. We take pleasure in recommending these commandments to our people and school children:

1. Thou shalt locate, report and abolish all public nuisances.

2. Thou shalt not spit on sidewalks or in any public place or conveyance.

3. Thou shalt remember that filth breeds flies, and that flies make funerals.

4. Thou shalt not sweep thy sidewalks in the business section after half past seven in the morning.

5. Thou shalt not throw tin cans or rubbish in any back yard, vacant lot or alley.

6. Thou shalt provide a covered receptacle for all manner of house and stable refuse.

7. Thou shalt gather and burn all sorts of combustible rubbish.

8. Thou shalt not haul refuse in leaky or overloaded wagons.

9. Thou shall wage continual warfare on weeds, dandelions and untrimmed trees.

10. Thou shalt whitewash or paint thy buildings, and shalt keep thy premises constantly clean.

The school children should be especially interested in the clean-up campaign, and all will be asked to help make their surroundings clean and sanitary.

Property owners and others are invited to aid in this hygienic and health-protecting movement.

The smallest yard and ugliest fence may be made attractive with flowers and vines, but cleanliness is more essential than ornamentation. Do both."

Deaths Proved Not Due to Antityphoid Vaccine.

Along with the agitation against smallpox vaccination there has also been considerable discussion against antityphoid vaccination, particularly in the newspapers. The following statements taken from *The Journal of the American Medical Association* for June 13, 1914, seem to prove the fallacy of such statements.

"Dr. S. S. Goldwater, Commissioner of Health of New York City, has rendered a great service to medicine and the public by causing an investigation of deaths and severe illness reported in the newspapers as due to antityphoid vaccine. According to newspaper statements, Clarence E. Pantzer, a private in the National Guard of Brooklyn, died as a result of injection of antityphoid vaccine. The Army surgeons who made the inoculation claimed that the death was not due to this cause. After a protracted dispute, in which Health Commissioner Goldwater recalled a burial permit previously issued, an autopsy was performed under the direction of the coroner, which showed that death was caused by malignant endocarditis. No evidence of typhoid fever could be found in the post-mortem examination. In another instance, two children were inoculated with the vaccine, at the request of their father, who was at the time sick with typhoid. Marked and severe symptoms later occurred, which were immediately credited to the injection of the vaccine, and the statement was made that the children were suffering from blood poisoning. Thus, the following statement appeared in a number of newspapers simultaneously:

"'While militiamen in many states of the west are being immunized against typhoid fever, two children in New York are near death as a result of typhoid serum injections. Their mother, brother, and aunt are recovering from an attempt to immunize them.'

"In this instance, as well, Dr. Goldwater ordered a thorough investigation, and it has now been shown definitely that both children are suffering from typhoid contracted, without any doubt, prior to the administration of the vaccine. In one case, owing to the pressure of an accumulation of cerebrospinal fluid, the disease closely resembled the epidemic form of meningitis: thus confusing still further the symptoms and making very difficult the diagnosis. In speaking of these cases, Deputy Commissioner Emerson emphasized the fact that typhoid vaccinations were both harmless and efficacious. 'According to the department's records most of the

secondary or direct contract cases become infected while the physician is waiting for more definite symptoms in the original case. In the presence of any illness, even remotely suspected of being typhoid fever, prompt immunization of every member of the family is of great advantage. Those who develop the disease after immunization invariably show evidence of having contracted the infection before the immunizing injection.'"

Scarlet Fever in Shanghai.

"As regards scarlet fever, in no country has any marked impression been made on its incidence by ordinary sanitary measures. In England it remains almost as common as measles, and natural immunity, the result of this prevalence, has produced a mild type of the disease. As the infection is almost entirely personal, in addition to the ordinary public sanitary measures, there is required for its adequate prevention a high general intelligence on the part of the community. If this want of success is met with in countries having all the benefits of modern sanitation and education, what can be expected in a community such as Shanghai, made up of so many elements. An unfortunate factor also is the extreme virulence of the infection met with in China—scarlet fever in Shanghai is more than four times as deadly as it is in England; and there is no indication yet of a decrease in virulence.—*Shanghai Health Report, 1913, by Dr. Arthur Stanley, Health Officer.*"

Food Control at its Source.

"At the meeting of the National Civic Federation held in New York recently, Dr. Carl Alsberg spoke, by invitation, of the sanitary and hygienic control of foods. Dr. Alsberg's ideas as expressed at this meeting represent what might be regarded as the new thought in the pure food world. That is to say, instead of spending so much money on police work, he would economize by spending money for prevention. If the food manufacturers can be made to observe good sanitary and hygienic laws there will be little foodstuff on the markets for inspectors to seize.

"Dr. Alsberg said: 'There is but one need in food control which is so vastly more important than all others that I propose to urge it alone upon your consideration. It is adequate sanitary and hygienic control of food.

"'By the sanitary and hygienic control of foods I mean the prevention of traffic in foods dangerous to health. To prevent this traffic is far more difficult than to prevent mere fraud in food products. Fraud may usually be detected by a chemical analysis. The danger to health that can easily lurk in a food can easily be detected in this way unless, indeed the food contain some simple poison like arsenic or lead. If, however, the food be manufactured in unsanitary surroundings, or if it be the bearer of tuberculosis, typhoid, measles or scarlet fever, this can hardly be detected. Hence, in my opinion, foods such as butter and milk, fish, and shellfish which are capable of this kind of contamination, should receive the greatest attention.

"'The only safeguard against these sources of danger is inspection of the place of production and medical supervision of the workmen. It should be impossible, for example, for a dairyman with a case of typhoid fever in his family to ship milk.

"'Obviously the exercise of such control of the sanitary conditions of food production is a task for the individual states. I would, therefore, urge upon you to secure such sanitary control of food production in every state. I can conceive of nothing more important.

"'If such a sanitary control is to be established you must clearly understand that to be effective it must rest upon an adequate health service. Outside of our larger cities such a service is most unusual.'"

Bulletin, Dairy and Food Division, Pennsylvania Department of Agriculture, April and May, 1914.

Health Week, 1914.

"Health Week has become an important institution in England. Although it will not be held this year until the week beginning November 15, yet the committee on organization has already commenced activi-

ties and has issued a pamphlet giving helpful suggestions to those who will have charge of making local arrangements. The immediate purpose of Health Week is to make health, during the specified week, the chief topic of public concern. During the past two years the week has been observed in about seventy different localities, but a large increase over this number is anticipated this year. The responsibility for the central organization was transferred this year from the Agenda Club to the Royal Sanitary Institute, thus placing authority in the most responsible hands."

American City, June, 1914.

Effluvia as a Cause of Disease.

The old theory of noxious emanations as a cause of disease is with us again. This time however it has some basis of physiological reasoning but it is doubtful if we can admit that the odor of sewer air is sufficiently irritating to the tissues lining the throat to cause congestion and consequent predisposition to diphtheria. The following note is clipped from the *Medical Officer* of June 6:

"Dr. H. Cooper Pattin, M. O. H., includes in his annual reports charts exhibiting the varying incidence of diphtheria at Norwich, week by week, each year. He believes that these charts afford convincing evidence that any condition of the atmosphere, or of the surroundings, which tends to produce a congested condition of the tissues lining the throat—such as damp, foggy weather, particularly when associated with low barometric pressure which leads to engorgement and relative congestion of the superficial vessels; or any irritating influence—such as the noxious effluvia constantly given off by the contents of bins, pail-closets, sewer air, fish and other refuse, etc.,—distinctly favours the development of diphtheria."

Profitable Conversion of Garbage.

The July issue of *Municipal Engineering* has an interesting note from a London correspondent on a new method of garbage disposal which unfortunately tells more of results than of the method itself. The article here quoted gives the impression that the action is rather magical.

"A method of garbage disposal which is finding considerable favor in England and which has been adopted amongst other towns in Southwark, Hove, Halifax, Blackpool, etc., consists in converting the house refuse collected by municipalities into a marketable fertilizer. The plant comprises a patent disintegrator or dust manipulator, a conveyor and an electric motor for driving. At Southwark, London, there are four sets of machinery which are erected in pairs, the two pairs facing each other, the conveyors conveying towards the center and discharging the output into a railway truck for immediate dispatch. The whole space occupied by the plant is only some 50 feet by 20 feet and no costly buildings are required. The machine which actually does the work is the dust manipulator which is a strong and powerful centrifugal force disintegrator. The dust carts tip their loads on a sheltered platform some 20 feet by 12 feet, where large tins and leather, which fetch a good price, are thrown aside by the workmen, while the remainder, including broken glass, crockery, slates, wood, and small tins, in one word, the whole of the unpicked refuse, is shovelled into the hoppers of the machine for treatment. In a second or two after entering the machine the house refuse finds its way out and falls on the conveyor in a uniform mass which cannot well be distinguished from dark, rich loam. Occasionally, a few very small bits of paper appear here and there on the surface, but these disappear very quickly owing to the disintegrating action of a rapid fermentation accelerated by the pounding the refuse received while passing through the machine. One very noticeable point is that immediately after treatment this mass, which previously had a most unpleasant smell, has entirely lost it and is not objectionable. The stuff thus treated is now ready to be spread at once on the soil as manure. Of the four dust manipulators at Southwark three are in constant use, one being kept in reserve and used when wanted. We understood that the output amounted to some 70

tons per day, and that the manure sold by the council to farmers and kitchen gardeners in Kent amounts to something like 18,000 to 20,000 tons per year. This manure is sold at 2s., 4d (56½ cents) per ton. Each machine is capable of treating up to 4 or even 5 tons of refuse per hour. The whole operation is performed in a manner cleanly, quiet, and free from any suspicion of nuisance, and the economical principle of giving back to the soil what comes from the soil is put into practice."

Bacillus Coli in Summer Diarrhoea.

"In the *Annali d'Igi ne Sperimentale*, Vol. 23, No. 4, 1913, De Blasi and Sampietro give particulars of researches carried out by themselves on the relation of Bacillus coli to summer diarrhœa. In a considerable portion of the cases of summer diarrhœa which they investigated B. coli was demonstrated to be present in pure culture. In others, more frequently than in normal fæces, non-lactose-fermenters were found; while in a few specific organisms, such as Morgan's bacillus, B. dysenteriæ, type Y, etc., were found.

"The B. coli isolated from diarrhœal stools were very virulent on inoculation subcutaneously or intraperitoneally into guinea-pigs, but were harmless when given by mouth to the same animals."

Public Health, June, 1914.

Public Health Administration and the Citizen.

"Public health administration in a community is as extensive, and the health department is as efficient, as the people want it to be. Health administration can neither exceed to any great extent, nor lag far behind the wishes of the people. An interesting illustration of this is the experience of the city of Wilmington, N. C., during the last two or three years. Two years ago public meetings were held in protest against the extension of public health work, while recently a mass meeting rallied to the support of the health department in opposition to the expressed intention of the majority of the city council to curtail the department budget."

Public Health Reports, June 12, 1914.

The Care of the Eyes in Measles.

If preventive medicine fails to stop the spread of measles it may at least help to prevent the blindness which may result, as the accompanying clipping from *The Medical Officer*, (Dec. 13, 1913) points out.

"Dr. A. T. Paterson, school ophthalmic officer to the Durham county council has pointed out in his annual report to Dr. Eustace Hill, C. M. O., that measles is the disease which, by the corneal opacities left in its train, ruins more eyes than all other causes (squint excepted) combined. 'It is at the same time,' he continues, 'the one cause that can most easily be guarded against. It is quite tragic to see week after week children with a large central corneal opacity spoiling the vision of one eye, and to be complacently told by the parent, "Oh, it was the measles that did it." A very serious responsibility rests upon the general practitioner for the loss of these eyes—either they do not sufficiently realize that next to broncho-pneumonia, the chief thing to watch in measles is the development of ulcerative conditions of the cornea, or else they do not sufficiently impress upon the parents the necessity of daily bathing the eyes of the child affected with a warm solution of boracic acid.' So strongly does he feel on this point that Dr. Paterson urges that the health department might, during epidemics of measles, send a circular to each medical practitioner in the area affected, pointing out the urgent necessity for instructing the parents as regards the care of the eyes during the course of the disease."

Royal Commission on Venereal Diseases.

At the eighth meeting of the Royal Commission on Venereal Diseases evidence was given by Sir William Thompson, Registrar-General for Ireland.

He said that as a cause of deaths venereal diseases played relatively a small part in Ireland. The death-rate from syphilis and allied diseases was 9.78 per 10,000 of the population, whereas the figures for tuberculosis, the head of the list, were 21.52 per 10,000.

Compared with previous years the deaths from syphilis and general paralysis of the

insane appear to show a tendency to increase, but Sir William Thompson thought that much of the increase was more apparent than real, and was due to the more careful recording of deaths.

The greater part of the deaths from venereal diseases occurred in the two cities, Dublin and Belfast. In Dublin the figures were abnormally high, the death-rates from syphilis and general paralysis of the insane being about twice those for London.

On the whole the incidence of venereal diseases in Ireland was very much lower than in the rest of the United Kingdom; the syphilis death-rate was only that of England and Wales, while with regard to infant mortality the number of deaths due to syphilis per 1,000 births in the three Kingdoms were England and Wales 1.29, Scotland 1.4, Ireland 0.59.

The Medical Officer, January 3, 1913.

Canadian Public Health Association.

The Canadian Public Health Association will meet this year on the 10th, 11th and 12th of September, in the twin cities of Port Arthur and Fort William.

The programme so far contributed promises to be the most interesting and useful the association has yet enjoyed.

Some of the leading features are the "Review by the Canadian Expert in Charge of the International Waterways Investigation as to the Extent of the Pollution of the Inland International Waters," of the findings and their significance. This takes up the first morning. Prof. John Amyot will contribute this matter. Experts from both sides of the line will take part in the discussion.

A symposium on the undesirable immigrant will take up the last morning of the session. Contributors are Prof. Dean Clarke, University of Toronto; Dr. Page, Quebec; Louis Kon, Winnipeg; Dr. MacMurchy, Toronto; Dr. Copeland, ship surgeon S.S. *Hesperian*, and others.

The section of engineers and bacteriologists have every new phase of treatment of water and sewage contributed by Mr. Geo. Fuller, consulting engineer, New York; Prof. Brydone Jack, Winnipeg; Dr. Naismith, Toronto; Mr. Dallyn, sanitary engineer, Toronto, and others.

The section of militia and transportation medical men have a programme extremely useful to any practitioner.

The section of medical inspection is practical from a scientific point as well as the administrative and financial side. Papers have been obtained by men of acknowledged standing along lines desired by the local committee.

The section of social workers has a most interesting and broad programme provided by full time experts working in the service in Winnipeg and other centres. Mr. Ihlder, of the National Housing Association, of New York, is one of the contributors.

The section of sanitary inspectors, meat and food inspectors, have contributions by such men as Tustin Haig, of Winnipeg; Watson, of Regina; Wilson, of Toronto, and Dr. Rutherford, of Calgary.

Two evening meetings will be held, addressed by Hon. Mr. Hanna and Prof. Hill of London.

PERSONAL NOTES.

The following persons were elected to membership in the American Public Health Association, July 30, 1914:

Harry Young Carson, Allston, Mass.
George FitzHugh Catlett, Wilmington, N.C.
Carl D. Geidel, Madison, Wis.
Nathan Q. Gorter, M.D., Baltimore, Md.
Morton Franklin Sanborn, Albany, N. Y.
Josephine Sanquinet, Fall River, Mass.
Nelson C. Scudden, M.D., Rome, N. Y.
John Henry Wright, New York, N. Y.

Twelve sanitary supervisors have been appointed to the State Department of Health of New York and they have already entered upon their duties, except Dr. Samuel D. Hubbard, New York City, who resigned. The department feels very much gratified that it has obtained the services of men whose past work has so fully qualified them for the important duties of this office. The appointments are as follows:—

Dr. Edward Clark, Buffalo. Dr. Clark

established the milk bureau of Buffalo and was Deputy Commissioner of Health from 1888 to 1890. He was appointed a member of the Public Health Council in 1913 and resigns to become Sanitary Supervisor.

Dr. Frederick W. Sears, Syracuse. Dr. Sears is health officer of Syracuse, appointed in January, 1913. He was Professor of Histology and Pathology in Syracuse Medical College, 1886–94, and health officer of Syracuse 1895–98. He has served on various public health committees for many years.

Dr. Harry H. Crum, Ithaca. Dr. Crum has been health officer of Ithaca since 1903. He established the first medical inspection of schools in Ithaca.

Dr. John J. Mahony, Jamestown. Dr. Mahoney has been health officer of Jamestown for eight years. He represented the Department this spring in investigating the smallpox epidemic in Chautauqua county.

Dr. Frank Overton, Patchogue. Dr. Overton is health officer of Patchogue and a lecturer on public health topics. He is the author of "Applied Physiology" for schools. He has been Secretary of the Suffolk County Medical Society since 1905 and was President of the State Sanitary Officers Association for two years.

Dr. Charles S. Prest, Waterford. Dr. Prest has been health officer of his village for eleven years. He is Chairman of the Legislative Committee of the New York State Sanitary Officers Association and resigns the position of Assistant Secretary of the Hospital Committee of the State Charities Aid Association to become Sanitary Supervisor.

Dr. LeRoy W. Hubbard, Mt. Vernon. Dr. Hubbard was appointed Medical Inspector of the Department of Health, New York City in 1897. In 1898 he was assigned to the Diagnosis Laboratory remaining there for eight years. He was Assistant Director of the Division of Communicable Diseases, Borough of Bronx, 1902–1910.

Dr. John Archibald Smith, Saranac Lake. Dr. Smith is milk inspector of Saranac Lake and Bacteriologist of the Saranac Lake Board of Health, and was the author of the present milk ordinance.

Dr. John A. Conway, Hornell. Dr. Conway is health officer of Hornell and has done special work in the Tuberculosis campaign. He has studied sanitary methods in both England and Scotland.

Dr. Charles C. Duryee, Schenectady. Dr. Duryee as health officer of Schenectady revised the Sanitary Code of that city and also organized the first municipal dispensary for tuberculosis in the State outside of New York City. He organized the first mayor's conference which was devoted entirely to the subject of public health in 1910.

Dr. Charles V. Patchin, Dansville. Dr. Patchin has been health officer of the town of Dansville for thirty years. He has had large experience in diagnosis, quarantine and control of contagious diseases. He has also been active in the agitation for the prevention of the adulteration of milk.

Dr. Dewitt C. Gilles, of Washington, D. C., on the staff of the Bureau of Animal Industry, United States Department of Agriculture, has been appointed Chief Food Inspector for the Board of Sanitary Commissioners, Savannah, Ga. This appointment was made as the result of a competitive examination held by a Board of Examiners in Savannah, Ga., Washington, D. C., Boston, Mass., and Chicago, Ill. Dr. Gilles secured the highest grades in veterinary pathology and bacteriology, in food inspection, and secured a high rating for education and experience. This examination was noted in an editorial in the JOURNAL for April, 1914.

Dr. Walter Bapty, who has been serving as acting secretary of the Provincial Board of Health of British Columbia, has received the appointment in the place of Dr. C. J. Fagan, who resigned. Dr. Fagan has acted as secretary to this board for many years.

INDUSTRIAL HYGIENE AND SANITATION

Occupational Fatigue.

In the June issue of the *Journal of State Medicine*, Sir Thomas Oliver contributes an article on "Occupational Fatigue" in which he makes a study of the various causes of fatigue in working people. This has several points of interest.

The author enumerates various causes of fatigue and the results as follows:

"(1) Night work for women and children.

"(2) The employment of young persons in arduous processes requiring the lifting and carrying of heavy weights beyond their strength and years. This is not only a cause of fatigue but of arrested physical development.

"(3) The question of age, generally, and its relation to output.

"(4) Too long hours and working overtime.

"(5) Work in continuous processes as carried on in iron and steel works. It is pointed out that work, if interrupted, promotes physical development.

"(6) Speeding up and the increased rate at which machinery is run in textile factories.

"Quite apart from the speeding-up of machinery in textile factories, the exhausting effects of working in warm, humid atmospheres deserves attention. Dr. Pembrey of Guy's Hospital, and Dr. Collis of the Home Office have reported upon this subject. 'In a warm, moist atmosphere the pulse quickens, the skin becomes flushed and warm, and the temperature of the mouth rises, approaching to the internal temperature which is raised to a smaller extent.' At work, weavers in cotton mills are on their feet all day; in watching the machines they are obliged to cover a good bit of ground daily, but this exercise is not sufficient to produce an unusual rise of temperature. Warm, moist temperatures reduce the differences between the internal temperature and that of the peripheral parts, and tend to establish a more uniform temperature of the body generally, and to throw a tax upon the powers of accommodation, as witness the low blood pressure. Muscular work raises the internal heat, and up to a certain point this is an advantage to the worker. But if the air is hot and moist, more blood is sent to the skin to be cooled and unless perspiration can take place there can be little or no reduction of temperature. This sending of more blood to the skin to be cooled, imposes more work upon the heart and makes demands upon the nervous system to regulate its distribution. Carried on under good conditions, work improves the appetite and keeps the bodily functions healthy; but a warm, moist skin in a humid atmosphere lessens the tone of the muscles, lowers the exchange of material in the body and depresses the appetite, hence the complaint of many cotton weavers who are pale, slim and short in stature, of loss of appetite, indigestion and fatigue. It is prolonged exposure to warm and humid atmosphere which creates the indisposition textile workers complain of. It would hardly appear, therefore, as if to the factory worker training and experience gave anything like the resistance which these give to the muscles, heart, and nervous system of the athlete who is exercised in the open air, partly because in the factory there are such adverse circumstances in operation as impure air, moist, warm atmosphere, noise and the speeding-up of machinery.

"(7) Upon alcohol as a cause of fatigue, time will not allow me to dwell, nor upon

"(8) The influence of noise, imperfect lighting, and

"(9) Dusty atmospheres.

"(10) Of poverty as a cause of fatigue it is hardly necessary to speak. To supplement his scanty earnings the worker is obliged to whip up his ill-nourished muscles to an extent far beyond their capability, without his having the means to obtain an adequate supply of food to replace the wear and tear the work has caused.

"A glance at the industrial progress of the second half of last century shows that while the actual physical burden imposed upon workers has in many instances been light-

ened, the greater use of labour-saving machinery has not only induced a degree of eye strain and of muscular monotony, but has necessitated a fixation of mental attention far beyond anything hitherto required. When to these is also added the burden imposed upon the system generally by breathing a vitiated atmosphere, there is created a sense of fatigue of a deeper type than that which followed the hard manual labour of a bygone age. The nervous system is more profoundly affected."

Early Diagnosis of Lead Poisoning.

In the June 6, 1914, number of the *Journal of the American Medical Association*, Dr. Harry Linenthal of the Massachusetts General Hospital, Out-patients' Department, has an interesting article on the "Early Diagnosis of Lead Poisoning" from which he draws the following conclusions:

"The reporting of occupational diseases is a public health measure. Early diagnosis of these diseases is essential both to protect the worker from the more serious effects of the industrial poisons and to gather information as to the prevalence of these diseases.

"In the diagnosis of plumbism, the most frequent of occupational poisoning, there is in many quarters a tendency to give too much emphasis to the presence of the lead-line or basophilic degeneration of the red cells. While the presence of these signs is often of great aid in the diagnosis of obscure cases of non-industrial origin, their absence should not prevent a diagnosis when certain symptoms characteristic of early plumbism manifest themselves, more particularly when a history of exposure to contact with lead can be obtained.

"The history of exposure is the all-important aid in the diagnosis, and careful inquiry should be made by the physician as to the details of the patient's work, and he should not be satisfied with a general designation which may not give any indication of exposure to lead."

Lawful Matches.

"On July 1, 1913, both the manufacture and sale of matches containing white phosphorus were brought to an end in this country. On that date the act which Congress recently passed, imposing a prohibitive tax on matches in which this substance is used, became a law.

"This law was enacted only after years of agitation which made the public aware of the terrible effects produced on the operatives in match factories. The disease contracted by the workers in match factories is commonly termed 'phossy jaw.' Just at the present time we have a very good example of the ravages of this dreadful disease in Illinois. Elizabeth Nemanich of Joliet was employed by the National Match Company, of Joliet, where she became a victim of 'phossy jaw.' She has submitted to three operations and now wears an artificial silver jaw. A few days ago she was awarded the paltry sum of $3,050.

"Since the passsage of the act referred to above, it has been discovered that there are other forms of phosphorus not of a poisonous nature. Phosphorus is obtained from bones, which consist mainly of phosphorus and lime chemically combined with each other and with organic matter. Two most commonly seen forms of phosphorus are the white, which is poisonous, and the red, which is practically harmless.

"Under the new law only two kinds of matches will be in use, the 'safety match,' which ignites when scratched on a specially prepared surface, and the 'bird's eye match,' which can be ignited on any dry surface.

"The main ingredient of the 'safety' match is chlorate of potash, while the surface on which it is to be lighted is painted with red phosphorus. The substance used for the tip of the 'bird's eye match' is sesquisulphide of phosphorus, a compound of comparatively harmless nature. A temperature of over 300° F. is required for igniting these matches. They cannot be ignited through being stepped on, they do not spark or fly, and are not explosive."

Illinois Factory Inspection Bulletin.

Safety First as a Branch of Health Work.

"The Safety First Campaign is a timely movement along lines for the saving of human lives, and as a preventive measure

deserves the hearty support and coöperation of every citizen. But even a casual study of the accidental deaths of the year would indicate that there is a broader field for the work of the safety propaganda than along the generally accepted lines; also that the educational side of the movement should be carried into every home and workshop in the city, to the end that the Safety First idea should become firmly implanted in the minds of our citizens, as a dominant factor of their lives all the time."

Bull. Chicago School of Sanitary Instruction, May 16.

Practical Results with Ventilation Systems.

In the monthly bulletin of the *American Museum of Safety* for June, 1914, Mr. D. D. Kimball, chairman of the section on ventilation and heating, cites some interesting facts relating to the increase of efficiency of workers due to good ventilation. There is not very much data obtainable of actual experiments made upon the efficiency of ventilation systems, but interesting facts may be obtained from the following results that have been collected by Mr. Kimball, which show that good ventilation has a marked effect on the decrease of sickness.

"The Germania Insurance Company of New York, in 1910, had eighty clerks in one office. Previous to the proper ventilation thereof, 10 per cent. were absent on account of illness all the while. Since then, absenteeism has been reduced practically to nothing.

"The vice-president of the Manhattan Trust Company of New York states that by proper ventilation he has so increased the efficiency of his clerical force that he has been able to reduce the number of employees 4 per cent.

"The records of the United States Pension Bureau show that when the offices of the department were located in scattered and poorly ventilated buildings, 18,736 days were lost by employees through illness in one year and about the same number for several successive years. When the department became established in new, well-ventilated quarters, the loss was reduced to 10,114 days' absence on account of illness, although the working force was much larger.

"In the printing establishment of Mr. C. J. O'Brien, in New York, a ventilation system was installed because of the insistence of the State Department of Labor that the law be complied with, the order having been resisted for two years. After the system had been in use a year the proprietor stated that had he known in advance of the results to be obtained, no order would have been necessary to have brought about the installation. Whereas, formerly, the men had left work on busy days in an exhausted condition and sickness was common, now the men left work on all days in an entirely different condition, and sickness had been very much reduced. The errors in typesetting and time required for making corrections were greatly reduced."

Industrial Conditions.

In *Public Health Reports* for May 29, 1914, Dr. B. S. Warren, of the United States Public Health Service, and Sanitary Adviser to the United States Commission on Industrial Relations, has a very stimulating and instructive article on Industrial Conditions and Their Relation to Public Health. In introducing the subject, he says that in the study of methods for the prevention of disease, investigators have found that many of their problems are industrial and economic and that success in disease prevention very largely depends upon the proper adjustment of the industrial relations of employer and employee upon a basis that will permit both to live according to hygienic standards.

In order to bring about this adjustment and bring powerful aid to those influences already working for industrial betterment, the Public Health forces should coöperate heartily. Often it is found that the effects of industrial conditions extend to entire communities and are in a large part indirectly responsible for slum districts, alley dwellers, and low standards of living. From current published reports it is easily to be seen that industrial conditions, particularly relating to industrial hygiene and sanitation, are not what they should be.

The author believes that in order to make

any headway in disease prevention in the industries, the following four points at least be carried out.

1. Hours of labor which do not cause excessive fatigue or cause damage to any part of the body.

2. Regular employment at a wage sufficient to meet the cost of hygienic living and insure against sickness or other physical disability.

3. Sanitary environment in the place of employment.

4. Education as to methods of hygienic living and the importance of such living.

He does not place the responsibility for existing conditions of environment entirely upon the worker. One can not always choose his own environment. This will continue to be true, especially in the unskilled groups, so long as the supply of laborers is greater than the demand, and the competition for employment makes it possible for the employer to fix the terms of employment. The responsibility must rest mainly on the employer, but the state must do its part. The following list of hygienic requirements, outlined according to where the responsibility lies, seems to be of sufficient value to quote entire.

A. Employers' Responsibility

1. Mental and physical fitness of employees. Physical examination prior to employment, and periodically thereafter.

2. Wages.

(*a*) Adequate to maintain the employees as to (1) proper food, (2) clothing, (3) hours for rest and recreation, and thereby maintain an efficient and healthy mind and body.

(*b*) Increase or promotions according to length of service to provide for family and increase in family.

(*c*) Adequate to save for old age or pay for old-age pension.

3. Place of employment.

(*a*) General sanitary conditions, (1) proper heating, (2) proper humidity, (3) proper lighting, (4) no overcrowding, (5) proper ventilation, (6) proper cleaning, (7) clean water supply.

(*b*) Special dangers, (1) substitute harmless or least dangerous material for use of dangerous material whenever practicable, (2) safe handling of dangerous material by mechanical devices, etc.

(*c*) Removal of dust, gases, and fumes.

(*d*) Safeguarding against accidents.

(*e*) Equipment necessary for personal hygiene, (1) washing facilities, (2) toilets (3) rest rooms, (4) lockers, etc.

4. Mental and physical energy expended.

(*a*) Hours of labor, (1) length of work day, (2) overtime, (3) night work.

(*b*) Fatigue; (1) rest, recreation, and sleep necessary to eliminate waste and restore body cells prior to beginning day's work; (2) posture, speed of work or attention required, which causes unusual strain to be eliminated where practical, or adequate rest periods to be allowed; (3) monotony of occupation as cause of fatigue.

5. Age and sex of employees.

(*a*) No child labor under 14 years.

(*b*) No night work for women, young people, or children.

6. Compensation for sickness and accident incident to employment.

7. Regular employment in so far as practicable.

8. Medical supervision by company physician.

(*a*) Prompt medical and surgical aid.

(*b*) Sanitary inspections.

(*c*) Elimination in an equitable manner of the mentally and physically unfit.

9. Contributor to sick insurance fund.

10. Education of employees.

(*a*) Prevention of disease.

(*b*) Prevention of accidents.

(*c*) Special rules for dangerous processes.

B. Employees' Responsibility.

1. Home environment.

(*a*) General sanitary condition as to (1) heating, (2) humidity, (3) lighting, (4) overcrowding, (5) ventilation, (6) cleanliness, (7) clean water supply.

(*b*) Special sanitary condition.

(*c*) Personal hygiene, obtain proper (1) food, (2) clothing, (3) bathing, (4) rest, (5) recreation and avoidance of dissipation.

2. Places of recreation.

(*a*) General sanifary conditions.

(*b*) Special sanitary conditions.

(*c*) Personal hygiene, no dissipation.

3. Regular employment.

(*a*) Seek employment.

(*b*) Prompt attendance.

4. Procuring medical and surgical relief in case of sickness or accidents.

5. Contribution to sick insurance fund.

6. Education.

(*a*) Prevention of sickness.

(*b*) Prevention of accidents.

(*c*) Special rules for dangerous processes.

(*d*) Study to increase efficiency and fitness for promotion or increase in pay.

C. State Responsibility.

1. Housing—home, shops, places of amusements, etc.

(*a*) Sanitary building regulations.

(*b*) Special regulations governing sanitation.

(*c*) Sanitary inspections.

(*d*) Licensing of dangerous trades.

(*e*) Personal hygiene requirements.

2. Regulations of hours of labor.

(*a*) Day and night, to prevent exhaustion.

(*b*) No night work for women, young persons, or children.

(*c*) No child labor under 14 years.

(*d*) Overtime to be eliminated where practicable.

3. Minimum wage scale.

4. Medical supervision.

(*a*) Free hospitals for indigents.

(*b*) Dispensaries for indigents.

(*c*) Regulations governing medical attendance in certain industries.

5. Pure-food regulations.

6. Pure water supply.

7. Special measures to prevent disease.

8. Regulation of social insurance or compulsory sick and old age insurance.

9. Education of those concerned.

Education in Personal Hygiene for Employees.

"The one thousand women employees of the Emporium, a large San Francisco store, are given instruction in various phases of general hygiene, including lectures on sex hygiene. They are divided into groups of sixty-five each, one class each day. The course includes also lectures on dietetics, food values, care of the feet, care of the teeth and other branches."

Physical Culture, April.

CURRENT PUBLIC HEALTH LITERATURE.

AMERICAN.

Albany Medical Annals.

XXXV, No. 5. May.

Bender Hygienic Laboratory. H. S. Bernstein.

XXXV, No. 6. June.

Medical Inspection and Examination of School Children. P. V. Winslow.

American Journal of Medical Sciences.

CXLVII, No. 6. June.

Examination of One Hundred Painters for Evidence of Lead Poisoning. E. R. Hayhurst.

Archives of Internal Medicine, Chicago.

XIII, No. 6. June.

Attempts to Produce Scarlatina in Monkeys. C. Krumweide, J. S. Pratt.

German Measles: An Experimental Study. A. F. Hess.

Boston Medical and Surgical Journal.

CLXX, No. 26. June 25.

Function of Social Service of Psychopathic Hospital, Boston. M. C. Jarrett.

Engineering Record.

LXX, No. 1. July 4.

Imhoff Tanks to Increase Capacity of Baltimore's Sewage Treatment Plant. L. C. Frank.

Test of San Francisco Garbage Incinerator.

Covers for Sprinkling Filters.

Improving the Water Supply of Galveston, Texas.

LXX, No. 2. July 11.

Cost of Cleaning and Repairing Weston Aqueduct.

Underdrain Experiences at Kansas City, Kan.

LXX, No. 3. July 18.

Removal of Carbonic Acid, Iron and Manganese from Lowell Well-Water Supply.

New York State's Policy on Problems of Water and Sewage.

Journal of Infectious Diseases, Chicago.

XIV, No. 3. May.

Colon Group of Bacteria. L. A. Rogers, W. M. Clark, and B. J. Davis.

New Method of Determining Relative Stability of Sewage Effluents. A. Lederer.

Comparison of Plating and Microscopic Methods in Bacteriologic Examination of Milk. G. W. Goodrich.

Journal of Medical Research, Boston.

XXX, No. 2. May.

Leprosy: Flies in Relation to Transmission of Disease. J. A. Honeij and R. R. Walker.

Journal of the American Medical Association, Chicago.

LXII, No. 26. June 27.

The Service of Medicine to Civilization. V. C. Vaughan.

The Treatment of Tetanus by Antitoxin. E. E. Irons.

History of a Typhoid Carrier. M. P. Ravenel.

LXIII, No. 1. July 4.

Supposed Poisonous Properties of Chestnuts Grown on Trees Affected with Chestnut Blight. C. D. Marsh.

LXIII, No. 2. July 11.

Influence of Hookworm Disease on the Eyes. J. W. Jervey.

State Insurance Against Sickness. R. A. Allen.

LXIII, No. 3. July 18.

Experiments on the Curative Value of the Intraspinal Administration of Tetanus Antitoxin. W. H. Park and M. Nicoll.

New York Medical Journal.

XCIC, No. 25. June 20.

Alein in Relation to Spread of Acute Infectious Disease. L. L. Williams.

Antituberculosis Campaign. J. Rosenburg.

Ohio State Medical Journal, Columbus.

X, No. 6. June.

What Are Practical Health Measures? Who should Lead and Why? O. Dowling.

Public Health Reports.

XXIX, No. 26. June 26.

The Etiology of Pellagra—The Significance of Certain Epidemiological Observations with respect Thereto.

What Is a Safe Drinking Water?

XXIX, No. 27. July 3.

Plague Reported in New Orleans.

Cancer: Is It on the Increase?

Court Decisions Relating to Morbidity Reports. The right of the Community to Require Physicians to Report Cases of Disease Coming Under Their Observation and the Purposes thereof and Reasons Therefor as Stated by Courts of Last Resort.

XXIX, No. 28. July 10.

Plague in New Orleans.

Biological Products. Establishments licensed for the Propagation and sale of Viruses, Serums, Toxins and Analagous Products.

Trachoma. A Survey of its Prevalence in the Mountain Sections of North and South Carolina.

The Notifiable Diseases. Their Prevalence by States During 1913. Supplement No. 12 to Public Health Reports.

Surgery, Gynecology and Obstetrics, Chicago.

XVIII, No. 6. June.

Educational Value of Cancer Statistics to Insurance Companies, Public and Medical Profession. F. L. Hoffman.

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Berliner Klinische Wochenschrift.

LI, No. 20. May 18.

Behring's Method of Vaccinating Against Diphtheria. E. V. Behring and R. Hageman.
Effect of Compressed Air. A. Bornstein.

Bulletin de l'Academie de Medicine, Paris.

LXXVIII, No. 20. May 19.

The Bacteriological Concept of the Field of Tuberculosis. F. Bezancon.

LXXVIII, No. 21. May 26.

Antityphoid Vaccination of Personnel of Paris Hospitals. Mesurer.

LXXVIII, No. 23. June 9.

Principles of a Method Designed to Diminish Contagiousness of Communicable Diseases Through the Air of Sick Rooms. T. Trillat.

Correspondenz Blatt fur Schweitzer Aerzte, Basel.

XLIV. No. 20.

Typhoid Epidemic in Zurich District. R. Frey.
The Goitre Problem. T. Dieterle, L. Hirschfeld and R. Klinger.
Postmortem Findings in Paratyphoid Infection.

Deutsche medizinische Wochenschrift, Berlin.

XL, No. 22. May 28.

Latent Tuberculosis in Children. H. Kleinschmidt.

XL, No. 23. June 4.

Diphtheria Combatting and Diphtheria Prophylaxis. W. Braun.

Lancet, London.

No. 4737. June 13.

Aerial Conveyance of Infections. F. H. Thomson and C. Price.

No. 738. June 20.

Hygienic Aspect of Coal Mining Industry in United Kingdom. F. Shufflebotham.

Medical Officer, London.

XI. No. 25. June 20.

Risks of Smallpox in View of the Declining Vaccination Returns of This Country. A. K. Chalmers.

XI, No. 26. June 27.

Canadian Children Under School Age. H. McMurchy.

XII, No. 1. July 4.

Sanitation in India.
A Juvenile Psychiatric Clinic. R. Hughes.

Medizinische Klinik, Berlin.

X, No. 20. May 17.

Nature of Whooping-Cough and Conditions in Regard to Contagion. A. Feer.

Presse Medicale, Paris.

XXII, Nos. 46-48.

Milne's Method of Treatment in Scarlet Fever and Measles. M. N. Wilboushewitch.
Etiology of Scarlet Fever. H. Roger.

Public Health Journal, Toronto.

No. 6. June.

Transmission of Typhoid. H. W. Hill.
Sunlight in Cities. T. Broekmann.
Housing Problem. E. W. J. Hague.
Economic and Racial Waste Through Insanitary Homes and Workshops. T. M. Molloy.
Town Planning and Its Influence on Public Health. A. L. Favell.
Veterinary Hygiene and Public Health. C. H. Higgins.

Journal of Pathology and Bacteriology, London.

XVIII, No. 4. April.

Investigation Concerning Dohle's Leukocytic "Inclusion Bodies" in Scarlet Fever and Other Diseases. W. MacEwen.

Riforma Medica, Naples.

XXX, No. 16. April 18.

Typhoid Bacilli Can Often Be Cultivated from the Mouth Early in Typhoid. E. Mondolfo.

Semana Medica, Buenos Aires.

XXI, No. 15.

Sanitary Regulation of Railroad Transportation.